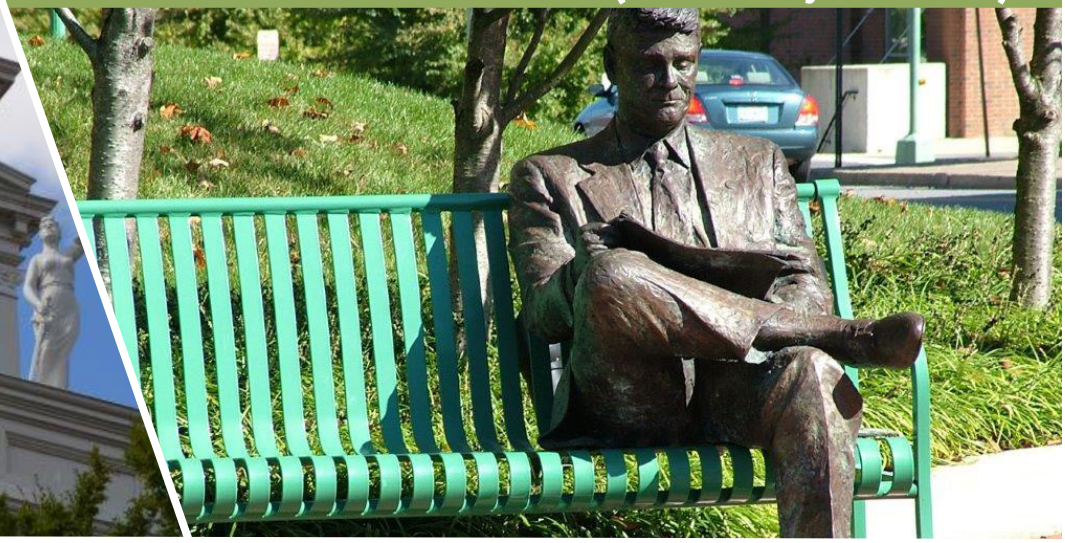
CLARKSVILLE URBANIZED AREA 2045

Clarksville Metropolitan Planning Area
Air Quality Conformity Analysis
(Kentucky Portion)



January 2019

Clarksville Urbanized Area
Metropolitan Planning Organization

Clarksville Urbanized Area MPO
Metropolitan Transportation Plan 2045

Air Quality Conformity Analysis

Prepared By:

In Cooperation With:

Kentucky Transportation Cabinet

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U.S. Department of Transportation
Federal Highway Administration

Federal Transit Administration

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ES. Executive Summary

This report explains the results of the air quality analysis for Christian County, Kentucky. It also describes the methodology used by the Clarksville Urbanized Area MPO (CUAMPO), Kentucky Transportation Cabinet (KYTC), and Neel-Schaffer, Inc. to demonstrate transportation conformity under the air quality standards/goals of the Clean Air Act Amendments of 1990. This process is required for the purpose of adopting a new Metropolitan Transportation Plan (MTP) and Transportation Improvement Program (TIP) since the county is designated Attainment with a Maintenance Plan.

Both counties within the Metropolitan Planning Area (MPA) were previously considered non-attainment for the National Ambient Air Quality Standard (NAAQS.) On November 21, 2005, Montgomery County was redesignated as Attainment with a Maintenance Plan for 8-hour National Ambient Air Quality Standard (NAAQS) ozone standard. On February 24, 2006, Christian County was redesignated as Attainment with a Maintenance Plan for 8-hour ozone standard.

There are three (3) subareas for the purpose of transportation air quality conformity analysis:

- Kentucky donut
- Kentucky MPO area
- Tennessee MPO area

The Kentucky donut is any area within Christian County that is not part of the MPA. Transportation planning for the donut area is the responsibility of the Kentucky Transportation Cabinet (KYTC); while transportation planning for the Kentucky and Tennessee MPO areas is the responsibility of the CUAMPO. However, all of the analysis subareas must implement transportation conformity in the same manner.

The Fort Campbell Army base is located within both Montgomery and Christian Counties. However, the base is subject to the general conformity rule (58 FR 63214) and is considered an external station for the purpose of transportation conformity.

The conformity analysis uses the MOVES2014a model, the most recent planning assumptions from KYTC and the MPO's Travel Demand Model (TDM), and the

incorporation of the projects listed in the MTP and Kentucky's FY2018-FY2024 Recommended Highway Plan (shown in Appendix A). The Motor Vehicles Emissions Budgets (MVEB) established in the current State Implementation Plan (SIPs) for the Clarksville-Hopkinsville area are used to determine the region's air quality conformity. The MVEBs were established at the state level, with a separate MVEB established for the county. The MVEBs for Christian County are:

- 3.83 tons per day (TPD) for oxide with nitrogen (NOX)
- 2.08 TPD for volatile organic compounds (VOC)

Table ES.1 displays a summary of the MVEB results for Christian County. The MTP complies with the Clean Air Act Amendments of 1990, the Transportation Conformity Regulation, the Statewide and Metropolitan Planning Regulation, and other applicable federal and state requirements. The emissions results were developed using the guidance found in "MOVES2014 and MOVES2014a Technical Guidance: Using MOVES to Prepare Emission Inventories for State Implementation Plans and Transportation Conformity".

Table ES.1: Summary of On-Road Mobile Source Emissions by Year in Tons/Day

Pollutant	SIP MVEB	2026 Tons/Day	2036 Tons/Day	2045 Tons/Day
NOx	3.83	1.71	0.82	0.69
VOC	2.08	0.72	0.45	0.38

Source: NSI, 2018; CUAMPO, 2018

Based on the conformity analysis conducted for the MTP 2045, it can be concluded that:

- The MPO finds no factors in the TIP or MTP that would cause or contribute to a new air quality violation or exacerbate an existing violation in the years before the first analysis year for the Kentucky portion of the maintenance area.
- The MPO finds that no goals, directives, recommendations, or projects within the TIP or MTP contradict any specific requirements or commitments of the Kentucky SIP.

- The applicable implementation plans do not contain any Transportation Control Measures; therefore, nothing in the TIP or MTP can interfere with their timely implementation.
- The VOC and NO_x, emissions in the Kentucky portion of the Clarksville-Hopkinsville area do not exceed the established MVEBs.

CUAMPO
Air Quality Conformity Analysis (Kentucky Portion)

1.0 Background

The Clarksville MPA consists of Montgomery County, Tennessee and the southernmost portion of Christian County, Kentucky. The planning area is shown in Figure 1.2 of the MTP 2045, available from the MPO. On July 18, 1997, the Environmental Protection Agency (EPA) developed a revised 8-hour ozone standard of 0.08 parts per million (ppm), which was more stringent than the previous ozone standard. As a result of the change, the EPA designated the Clarksville-Hopkinsville area (which is made up of Montgomery County, Tennessee and Christian County, Kentucky) as nonattainment for the 8-hour average ozone NAAQS, and designated a basic ozone nonattainment area.

However, both counties have since been redesignated as Attainment with a Maintenance Plan for 8-hour National Ambient Air Quality Standard (NAAQS) ozone standard. The Clarksville-Hopkinsville area is still required to perform conformity analysis for the following three areas:

- The Kentucky donut (which encompasses Christian County but is not part of the MPA)
- The Kentucky MPO area (which is the portion of Christian County within the MPA)
- The Tennessee MPO area (which is the entirety of Montgomery County, with the exception of Fort Campbell)

In 2015, the Clarksville MPO stopped demonstrating conformity for the 2008 8-hour ozone standard due to the revocation of the 1997 8-hour ozone standard by EPA. The decision to revoke the 1997 ozone standard was vacated by the South Coast II Decision on Feb. 16, 2018, via USCA Case No. 15-1123. As a result, the Clarksville MPO must demonstrate conformity for the MTP and TIP. Effective on April 23, 2018, FHWA issued the Interim Guidance on Conformity Requirements for the 1997 ozone standard dated April 23, 2018, which states that new MTP and TIP updates and amendments that include the addition of a project that is not exempt from transportation conformity may not proceed until conformity with the 1997 ozone NAAQS is determined. This conformity determination complies with FHWA's April 23, 2018 guidance until further notice is given.

While the MPO is designated Attainment with a Maintenance Plan, and thus has a 5-year planning cycle, the conformity analysis must be conducted every four (4) years for MTPs and TIPs, as per 40 CFR 93.104. It must also conduct the analysis each time the MTP or TIP is updated, as per 40 CFR 93. The Fort Campbell Army base is considered an external station for the purpose of transportation conformity. In addition, transportation conformity requirements are applicable for any roadway that receives funding or approved under Title 23 or 49 through the U.S. Department of Transportation (U.S. DOT). Fort Campbell does not contain any roadways that meet these conditions and is therefore exempt from conformity requirements.

2.0 Interagency Consultation and Process

As required by 40 CFR 93.105, the MPO formed an Interagency Consultation (IAC) to guide the conformity analysis. This group includes representatives from:

- EPA Region 4
- Federal Highway Administration (FHWA) Division Offices from both Kentucky and Tennessee
- Federal Transit Administration (FTA)
- KYTC
- Kentucky Division for Air Quality (Ky. DAQ)
- Tennessee Department of Transportation (TDOT)
- Tennessee Division of Air Pollution Control (TDAPC)
- Tennessee Department of Environment & Conservation (TDEC)
- Clarksville Transit System (CTS)
- CUAMPO
- Members of local governments

Another purpose of the IAC was to approve the planning assumptions (40 CFR 93.110) used to develop the conformity analysis. This was conducted through a series of meetings and phone conferences. The meeting minutes are included in Appendix B. In addition to the IAC, as required by 40 CFR 93.105, the conformity analysis must be made available to the general public during the public commenting period as part of the consultation process.

3.0 Analysis Years, Planning Data, and Assumptions

3.1 Analysis Years

The IAC was responsible for selecting the analysis years used to conduct the air quality conformity. A pre-analysis consensus plan (shown in Appendix C) was developed and proposed to the IAC during a phone call on June 28, 2018. The plan recommended the use of the TDM's scenario years as the conformity analysis years. This recommendation was accepted during the IAC call, with exception to 2016, the model base year, which was in the past. The emissions calculated for each analysis year were then compared to the 2016 MVEBs to determine if the area can meet the conformity test.

3.2 Planning Data and Assumptions

There is no Inspection/Maintenance program within the Clarksville-Hopkinsville area. Furthermore, there are no Transportation Control Measures (TCMs) in the SIP, meaning that the implementation of the projects in the Statewide Transportation Improvement Program (STIP) will not interfere with timely implementation of TCMs.

Regardless of the funding source, all regionally significant projects are included in the regional emissions analysis for their respective analysis year. The projects included in the conformity analysis (listed in Appendix A) are from the MTP's Staged Improvement Program, STIP, Kentucky's FY2018-FY2024 Recommended Highway Plan, or other regionally significant projects. These planning assumptions were agreed upon during the IAC Meetings. The conformity status of each project is displayed in the table included in Appendix A.

Projects identified in the Metropolitan Transportation Plan or Transportation Improvement Plan must be identified as being exempt, non-exempt, or regionally significant. Projects that are exempt are not subject to the transportation conformity rule. Projects that are non-exempt must be shown in the region's conformity analysis. Projects that are regionally significant are non-exempt projects that are on roadways that serve regional needs, such as access to and from the area outside of the region, major activity centers in the region, major planned developments such as new retail malls, sports complexes, etc., or transportation terminals. The transit projects identified in Chapter 10 of the Metropolitan Transportation Plan were determined to be exempt.

4.0 Emissions Projections

The emission estimates obtained in the analysis were calculated using EPA's MOVES2014a software. Model runs were conducted for the entirety of Christian County for each of the analysis years. The model inputs and summary outputs are shown in Appendix D and Appendix E, respectively. The monthly VMT fraction, daily VMT fraction, hourly VMT fraction, speed fraction, and AVFT inputs can be obtained from the MPO. The TDM was developed by Neel-Schaffer, Inc. as part of the MTP 2045 update. The following sections describe the MOVES2014a inputs used to calculate the NOx and VOC emissions within Christian County.

4.1 RunSpec Settings

For each MOVES model run, the parameters are contained within the RunSpec. These inputs determine the geographic and temporal scale of the model run, as well as the specific emissions to be calculated. The settings used in the conformity analysis were:

- Scale
    - Onroad (for Model)
    - County (for Domain/Scale)
    - Inventory (for Calculation Type)
- Time Spans
    - Hourly (for Time Aggregation Level)
    - Analysis years of 2026, 2036, and 2045
    - Weekdays (for analysis Days)
    - Month of July
    - All hours
- Geographic Bounds
    - Christian County, Kentucky

- Vehicles/Equipment
    - All on-road vehicle and fuel combinations selected
- Road Type
    - All road types selected
- Pollutants and Processes
    - NOx
    - VOC
    - Total Gaseous Hydrocarbons (VOC pre-requisite)
    - Non-Methane Hydrocarbons (VOC pre-requisite)
    - Refueling Displacement Vapor Loss and Refueling Spillage Loss are de-selected in the RunSpec as per the pre-analysis consensus plan.
- Strategies/Rate of Progress
    - Rate of Progress is not selected in the RunSpec as the MPO is not required to do so.

4.2 Data Sources

The MOVES model provides many of the necessary inputs through its own internal database or available default data. However, some inputs need to be provided by the MPO and consultant team. Table 1 displays the initial data sources used for the MOVES input data. The development of the model inputs is discussed in Appendix F.

Table 1: Data Sources for MOVES Input Files

Input	Description	Christian County
roadTypeDistribution	Distribution of VMT within the modeled area based on MOVES roadway types	KYTC, 2018
sourceTypeYear	Total number of vehicles in MOVES vehicle classes	KYTC, 2018
HPMSVTypeYear	Annual VMT of the modeled area by HPMS vehicle classes	KYTC, 2018
HPMSVTypeDay	Daily VMT of the modeled area by HPMS vehicle classes	N/A
monthVMTFraction	Monthly VMT adjustment factors when using annual VMT.	KYTC, 2018
dayVMTFraction	Daily VMT adjustment factors when using annual VMT	MOVES Defaults
hourVMTFraction	Hourly adjustment factors.	MOVES Defaults
avgSpeedFraction	Speed distribution by MOVES speed bins, hour, and roadway type.	KYTC, 2018
ageDistribution	Vehicle age breakdown by source type	KYTC, 2018
rampFraction	Percentage of interstate VHT on ramps	KYTC, 2018
ZoneMonthHour	Area meteorology data	MOVES Data Converter
FuelSupply	Fuels used in the modeled area	MOVES Defaults
FuelFormulation	Fuel formulation data within the modeled area	MOVES Defaults
FuelUsageFraction	Market share of fuels within the modeled area	MOVES Defaults
AVFT	Alternative Vehicle and Fuels Technologies	MOVES Defaults

Source: NSI, 2018; CUAMPO, 2018

4.3 Input Data

ageDistribution

Emission factors vary by the age and type of vehicle (shown in Table 2) on the roadway network. The MOVES model requires a vehicle distribution as the fraction of vehicles by age and source type. The age distributions were developed for the following vehicle types based on the state's motor vehicle registration data:

- Motorcycle
- Passenger Car
- Passenger Truck
- Light Commercial Truck
- School Bus
- Refuse Truck
- Single Unit Short-haul Truck
- Single Unit Long-haul Truck
- Motor Home
- Combination Short-haul Trucks
- Combination Long-haul Trucks

Since no vehicle registration or local data sources were available for the following age distributions, MOVES default age distributions were used for:

- Intercity Bus
- Transit Bus

Table 2: MOVES Source Types and HPMS Vehicle Types

Source Type ID	Source Type Description	HPMS Vehicle Type ID	HPMS Vehicle Type Description
11	Motorcycle	10	Motorcycles
21	Passenger Car	25	Light Duty Vehicles- Short and Long Wheelbase
31	Passenger Truck		
32	Light Commercial Truck		
41	Intercity Bus	40	Buses
42	Transit Bus		
43	School Bus		
51	Refuse Truck	50	Single Unit Trucks
52	Single Unit Short-haul Truck		
53	Single Unit Long-haul Truck		
54	Motor Home		
61	Combination Short-haul Truck	60	Combination Trucks
62	Combination Long-haul Truck		

Source: EPA

roadTypeDistribution

The MOVES model requires a distribution of VMT as the fraction of vehicles on each road type (shown in Table 3) by source type.

$$VMT\ fraction = \frac{VMT_i\ on\ road\ type}{\Sigma\ VMT_i\ of\ source\ type}$$

Where i = source type

This data was developed by the KYTC for each analysis year using the TDM developed for Christian County. However, local data was not available for each source type. The same road type distribution for all source types within the HPMS vehicle (Table 2) class was used (i.e., Intercity Bus, Transit Bus & School Bus from Buses.) A road type fraction was not assigned to the non-road classification.

Table 3: MOVES Road Type

Road Type ID	Road Type Description
1	Off-Network
2	Rural Restricted Access
3	Rural Unrestricted Access
4	Urban Restricted Access
5	Urban Unrestricted Access

Source: EPA

sourceTypeYear

Since each vehicle type has different emission rates, the MOVES model requires the total number of vehicles in each source type. This input was provided by KYTC.

HPMSVTypeYear

A key input in the MOVES model is the annual or daily VMT on the roadway network; as increased travel means increased emissions. Using a TDM for Christian County, KYTC provided the annual VMTs within the modeling area for each analysis year. These VMTs were adjusted to account for differences between the TDM and HPMS dataset. The seasonal adjustment factors provided by KYTC were then used to come up with the VMT by functional classification, which are aggregated to the HPMS classes used in the MOVES model. The HPMS and seasonal adjustment factors are shown in Table 4.

Table 4: VMT and Seasonal Adjustment Factors

Functional Classification	HPMS Adjustment Factor	Seasonal Adjustment Factor
1- Rural Interstate	1.0890	1.0270
2- Rural Principal Arterial	0.7570	1.0140
6- Rural Minor Arterial	1.1440	1.0140
7- Rural Major Collector	0.9020	1.0140
8- Rural Minor Collector	0.9190	1.0140
9- Rural Local	0.5240	1.0140
11- Urban Interstate	0.0000	0.0000
14- Urban Principal Arterial	0.7590	1.0100
16- Urban Minor Arterial	1.1390	1.0100
17- Urban Collector	1.5750	1.0100
19- Urban Local	0.9490	1.0100
Rural Centroid Connector	1.0000	1.0140
Urban Centroid Connector	1.0000	1.0100

Source: NSI, 2018; KYTC, 2018

monthVMTFraction

The MOVES model uses this input(a proportion of the annual VMT for each month) to develop the monthly VMT on the modeled area's roadways based on the annual VMT input. This input was provided by KYTC for each analysis year.

dayVMTFraction

This input is used to further divide the monthly VMT into a daily VMT for modeling purposes. This input uses the default MOVES data for Christian County.

hourVMTFraction

Vehicle emissions are dependent upon the temperature, humidity, and other meteorological factors which can worsen pollutants from travel. The MOVES model applies a fraction distribution of VMT travelled by a given source type by time of day to determine the total number of vehicles on the road during that hour, as well as the emission rates to be applied.

averageSpeedFraction

The MOVES emission factors also vary by vehicle speed. The MOVES model requires the speeds to be input as a fraction of the VHT on the network based on speed bins (Table 5), road type, and hour. This input was provided by KYTC for each analysis year.

Table 5: MOVES Speed Bins

Speed Bin ID	Speed Bin Range
1	speed < 2.5 MPH
2	2.5 MPH <= speed < 7.5 MPH
3	7.5 MPH <= speed < 12.5 MPH
4	12.5 MPH <= speed < 17.5 MPH
5	17.5 MPH <= speed <22.5 MPH
6	22.5 MPH <= speed < 27.5 MPH
7	27.5 MPH <= speed < 32.5 MPH
8	32.5 MPH <= speed < 37.5 MPH
9	37.5 MPH <= speed < 42.5 MPH
10	42.5 MPH <= speed < 47.5 MPH
11	47.5 MPH <= speed < 52.5 MPH
12	52.5 MPH <= speed < 57.5 MPH
13	57.5 MPH <= speed < 62.5 MPH
14	62.5 MPH <= speed < 67.5 MPH
15	67.5 MPH <= speed < 72.5 MPH
16	speed >=72.5 MPH

Source: EPA

rampFraction

The MOVES model is able to analyze emissions on the ramps differently than those on the main line of the Interstate. The TDM selected by KYTC was used to develop the ramp fractions. The percent of the ramp VHT to the total interstate VHT is the rampFraction input. This input is calculated for each individual analysis year.

$$Ramp\ fraction = \frac{VHT\ on\ Interstate\ Ramps}{\text{Total VHT on Interstate}}$$

ZoneMonthHour

The MOVES model requires inputs of minimum and maximum ambient temperature and humidity for the day per hour. This input was provided by converting the MOBILE6.2 meteorological data from the previous conformity analysis into MOVES2014a. This means that the minimum and maximum daily temperatures used in the model for Christian County, Kentucky were 64 and 97 degrees Fahrenheit, respectively. The humidity value in the MOVES model also remains the same 75 gr/lb used in the previous conformity analysis.

Fuels and Reid Vapor Pressure

These input files (FuelSupply, FuelFormulation, FuelUsageFraction, and AVFT) use the default MOVES data.

5.0 Results and Conclusions

Table 6 summarizes the results of the on-road mobile source emissions obtained from the MOVES model by year. Figure 1 displays the results of the NOx analysis, while Figure 2 displays the results of the VOC analysis. The analysis indicates that emissions are expected to be less than the established MVEB for Christian County. This is largely due to more stringent emission standards for new cars and trucks. Newer vehicles with lower emissions will replace the older vehicles with higher emissions, which will help to improve the air quality.

Table 6: Summary of On-Road Mobile Source Emissions by Year in Tons/Day

Pollutant	SIP MVEB	2026 Tons/Day	2036 Tons/Day	2045 Tons/Day
NOx	3.83	1.71	0.82	0.69
VOC	2.08	0.72	0.45	0.38

Source: NSI, 2018; CUAMPO, 2018

Figure 1: Comparison of NOx Emissions to MVEB by Year in Tons/Day

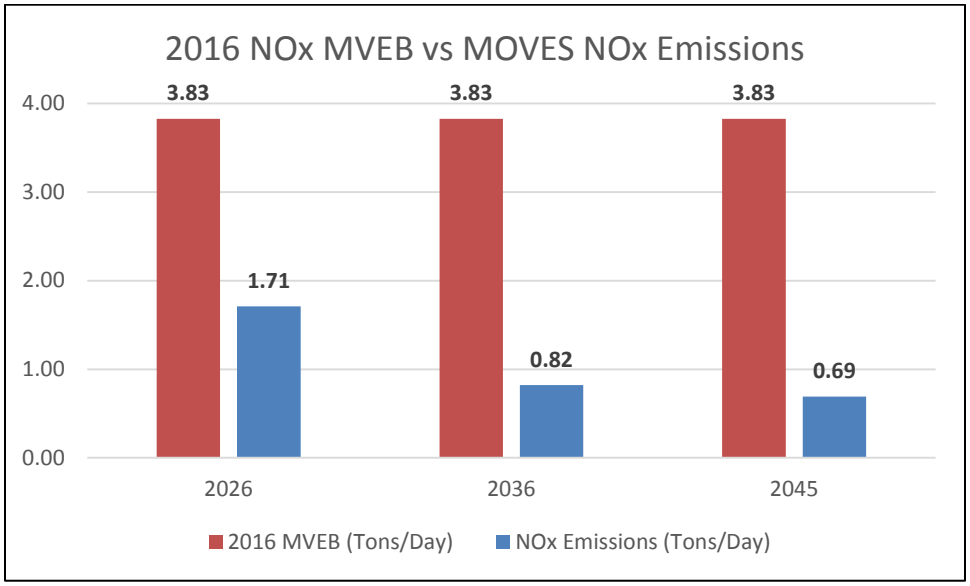
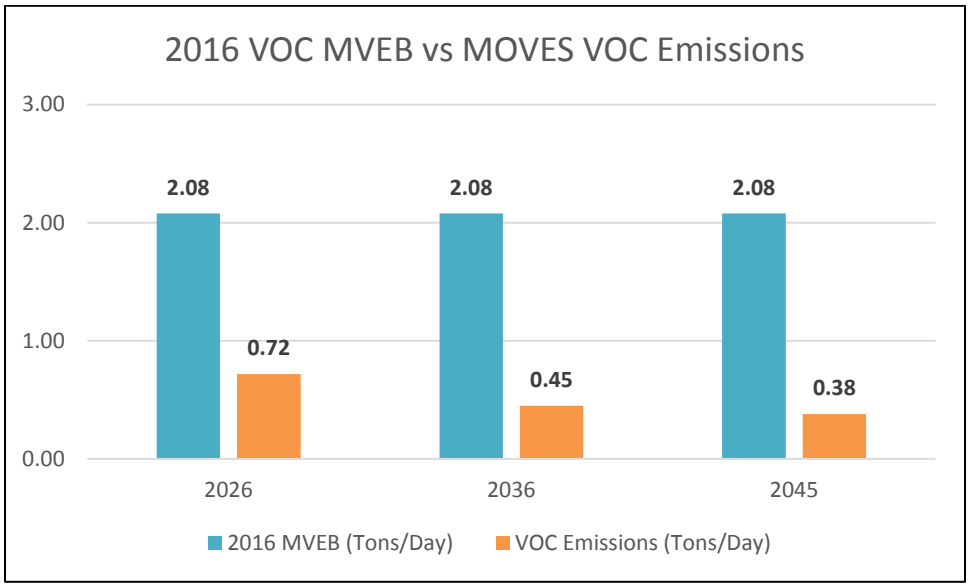


Figure 2: Comparison of VOC Emissions to MVEB by Year in Tons/Day



The analysis also indicates that the NOx and VOC emissions demonstrate a downward trend for each analysis year. These reductions show that the county is in conformity with the USEPA's "Budget Emissions Test" for all analysis years. Since the county is within attainment for the NAAQS, and future year emissions are estimated to be less than the MVEB, transportation improvements contained in the MTP should not interfere with future attainment or maintenance of the NAAQS for ozone.

Appendices

Appendix A: Roadway Projects in MOVES Analysis

Table A-1: Roadway Projects in MOVES Analysis

MTP 2045 ID	MTP Stage	Beginning Analysis Year	Roadway	Location	Improvement	Conformity Status
4	Stage I	2026	KY-911 (Thompsonville Rd)	US 41A to KY-115 (Pembroke Rd)	Widen from 2 to 3 Lanes	Non-Exempt
108	Stage I	2026	KY-400 (State Line Rd)	US 41A (Ft Campbell Blvd) to KY-115 (Pembroke-Oak Grove Rd)	Reconstruct with CTL	Non-Exempt
109	Stage I	2026	KY-115 (Pembroke-Oak Grove Rd)	KY-400 (State Line Rd) to I-24	Reconstruct with CTL	Non-Exempt
110	Stage I	2026	KY-115 (Pembroke)	I-24 to KY-1453 (Barker's Mill Rd)	Reconstruct with CTL	Non-Exempt
N/A	N/A	2026	KY-1682	E.T. Breathitt Pkwy to US-68/KY-80 East of Hopkinsville	New Roadway	Non-Exempt
N/A	N/A	2026	KY-911	KY-115 (Pembroke-Oak Grove Rd) to Oak Grove	Widen, Add Lanes	Non-Exempt
N/A	N/A	2026	KY-1007	US 68 to Sanderson Rd	Reconstruction	Exempt
N/A	N/A	2026	US-41	US 41 Near the Industrial Park to KY-115 South of Pembroke.	New Roadway	Non-Exempt
N/A	N/A	2026	EB-9004	@ KY-1682	Reconstruction	Exempt
N/A	N/A	2026	US-68	KY-91 to KY-1007	Reconstruction	Exempt
207	Stage II	2036	KY-117	US 41A (Ft Campbell Blvd) to KY-115 (Pembroke-Oak Grove Rd)	New 5 Lane Roadway	Non-Exempt

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MTP 2045 ID	MTP Stage	Beginning Analysis Year	Roadway	Location	Improvement	Conformity Status
209	Stage II	2036	KY-109 (Bradshaw Rd)	KY-1453 (Elmo Rd) to Bradshaw-Fidelio Rd	Reconstruct with CTL	Non-Exempt
111	Stage III	2045	Oatts-Riggins Rd	KY-400 (State Line Rd) to KY-911 (Thompsonville Ln)	New 3 Lane Roadway	Non-Exempt
112	Stage III	2045	KY-1453 (Elmo Rd)	US 41A (Ft Campbell Blvd) to KY-115 (Pembroke-Oak Grove Rd)	Reconstruct with CTL	Non-Exempt
205	Stage III	2045	Hugh Hunter/ Gritton Church Rd	KY-911 (Thompsonville Ln) to Allen Rd	Reconstruction	Exempt
208	Stage III	2045	Ft Campbell Gate 5 Ext	US 41A (Ft Campbell Blvd) to KY-115 (Pembroke-Oak Grove Rd)	New 2 Lane Roadway	Non-Exempt

Source: CUAMPO, 2018; KYTC, 2018

Appendix B: IAC Meeting Minutes

Clarksville Urbanized Area
Metropolitan Planning Organization (CUAMPO)
Interagency Committee (IAC)
Conference Call Minutes
May 30, 2018 @ 10:00 am

IAC Members Present:

Dianna Myers	EPA
Richard Wong	EPA
Jane Spann	EPA
Sean Santalla	FHWA
Elizabeth Watkins	FHWA
Mike Claggett	FHWA
Deborah Fleming	TDOT
Justin Harrod	KYTC
Thomas Witt	KYTC
Marc Corrigan	TDEC
Paul LaRock	TDEC
Leslie Poff	KYDAQ
Stan Williams	MPO
Jill Hall	MPO

Mr. Corrigan took roll and discussed the two purposes the IAC call was focused on: 1.What is needed to begin development of the conformity determination in response to the South Coast decision, and 2. the developments of the second 10-year maintenance plan by the states, also in response to the South Coast decision.

Ms. Myers spoke on item #3 on the agenda, the update on South Coast v. EPA petition for rehearing. She stated that in 2015 the Clarksville MPO stopped demonstrating conformity for the 2008 8-hour ozone standard due to the revocation of the 1997 standard by EPA. The February 2018 court decision vacated EPA's revocation of the transportation conformity requirement for the 1997 8-hour ozone standard, which will require the Clarksville MPO to demonstrate conformity for the MTP and TIP. EPA filed for a rehearing on the two aspects of the Court's decision: 1. Section 172(e); 2. Section 176(d)(5) of the Clean Air Act. EPA did not seek a rehearing on the second ten year maintenance plan requirement. If EPA is not granted a rehearing by the court, then a remand relative to the court decision back to the agency is requested so EPA can figure out how to implement the court's decision. The agency does not have a date for the rehearing. FHWA has developed a guidance memorandum to follow during the interim. No questions were asked of Ms. Myers.

Mr. Santalla spoke on item #4 on the agenda, the FHWA memo: Interim Guidance on Conformity Requirements for the 1997 Ozone NAAQS. He stated the memo was an effort by FHWA to comply with the ruling and is waiting for further information. An important part of the memo was that any MTP or TIP amendment for non-exempt projects can't move forward in those areas that were designated nonattainment for the 1997 8-hour ozone NAAQS, and attainment for the 2008 8-hour ozone NAAQS. Adjustments/administrative modifications of non-exempt projects may proceed. NEPA approvals may not proceed unless the project is in the existing MTP and TIP. Exempt projects and projects with a completed NEPA may move forward with no delay.

Mr. Claggett said FHWA has scheduled webinars for Conformity (June 12th) and MOVES (June 18th). Mr. Santalla will send out the link to the webinars when released by FHWA.

Mr. Corrigan asked when FHWA would require conformity determinations for the areas affected by the Court's decision.

Mr. Santalla stated the FHWA guidance memo is dated April 23, 2018 and from that date forward FHWA would no longer accept any documents without a conformity determination for approval based on the memo guidance.

Agenda item #5, Development and timing of the CDR and MTP update and item #6 Discussion of TDM development and socio-economic data development and growth was reviewed by Mr. Williams. He state the Travel Demand Model (TDM) has been developed and approved by TDOT and KYTC modeling divisions. The MTP is in draft form for chapters 1-5 and expects chapters 6-10 within the next two weeks. He expects the completed draft MTP by the end of June and then to send it out to TDOT and KYTC for review. After the states' review, the federal review should begin by mid-September. The MTP then goes to the TCC/Executive Board for approval at the end of November and adoption in January 2019. He said the MTP was currently on schedule. He said MTP with the conformity determination is attainable as long as the budgets can be met.

Mr. Corrigan stated that the IAC calls/meetings need to be inserted into the MTP development schedule. The IAC is responsible to review the MTP and CDR. He suggested that the IAC's 30 day review coincide with the draft review by the Federal agencies to help streamline the process.

Mr. Williams said the CDR adopted March 10, 2010 is on the MPO website at: http://www.cuampo.com/files/TnFinal031010.pdf . He asked the IAC to look at conformity determination developed for the earlier MTP and asked for suggestions or concurrence on the format used in the previous CDR as we review early chapter drafts. Mr. Corrigan was in agreement to review the previous CDR as an outline for the new CDR.

Mr. Santalla asked if the consultants would be able to meet the schedule for the MTP and CDR.

Mr. Williams said yes, they are planning and ready to assist with the CDR and MOVES modeling. He said the MPO/consultants will also handle the urbanized area in Kentucky. It is a very small portion from I-24 south to the TN state line (Oak Grove).

Mr. Harrod said that KYTC is ready and that most planning assumptions that will be done on the Christian Co, KY portions will be conducted with KYTC developed data and that KYTC has a separate model for the rest of Christian County.

Agenda Item #7, the MTP horizon years as currently proposed and Agenda Item #8 Analysis years for CDR. Mr. Williams said 2016 was the base year, 2045 was the final year, and the interim years would be 2026 and 2036.

Ms. Myers stated the budget year is 2016, therefore we must model that year because there is no other year to use for interpolation.

There was discussion on the selection of horizon years for the MTP and CDR. There was general agreement that the CDR should include the years: 2016, 2026, 2036 and 2045.

Mr. Harrod was unsure of the interim years from the 2010 CDR. After reviewing the last CDR, he said KYTC had a 2016 base year, 2026 interim year and planned to interpolate 2035 to 2036 and interpolate 2040 to 2045 for the final year within the Christian County model.

Agenda item #9, Planning assumption and data. Mr. Williams stated all planning assumptions can be provided from the travel demand model, the UT data center, the KY data center; the population from the U.S. Census, state data centers and included in the documentation of the TDM. He asked Mr. Corrigan about the meteorological data.

Mr. Corrigan said the meteorological data in MOVES doesn't work exactly the same as Mobile 6. He said there is a converter for the data between the two models and he can apply the converter and provide the data and KY can do the same. He said he believed this approach would keep the meteorological data consistent with the SIP. He offered to help with the MOVES inputs for the pre-analysis consensus plan.

Mr. Williams asked for something in writing to give to the consultants for requirements/expected of them to deliver for CDR.

Agenda item #10, MVEB/SIP considerations. Mr. Corrigan stated that emissions in the horizon years would need to be compared against the existing 2016 budgets in the respective SIPs.

Mr. Harrod said under the 2016 budget analysis with Mobile6 the values were very close. His concern was that under the MOVES model the 2016 budget can't be met.

Mr. Corrigan said that, as he sees it, there were three options concerning the budget:

1. The modeled emissions meet the budgets – no time delay if on schedule with the MTP development;
2. The model barely exceeds the budget, then the States can look at any available safety margin – this would take roughly 3-5 months, ideally to amend the SIPs.
3. If the model emissions exceed the budgets beyond the reach of the safety margins, then the States would most likely need to address this through the development of a second ten year maintenance plan – this may take approximately 18 months, possibly lowered to 12-15 months.

Ms. Myers said Mr. Corrigan was correct on the three options. She said there is no detailed guidance on how to do the second ten year maintenance plan with respect to the Court's decision. The only guidance EPA can provide is to discuss how it has been done historically. She said she was not advocating doing it as past times but that was the only guidance for now. She said the EPA approved the TN side on September 22, 2005 and had an effective date on November 1, 2005. The second maintenance plan would need to extend, on the Tennessee side, through 2025.

Mr. Corrigan said KY side had an effective date in 2006 and asked if, to be consistent and not require separate network years be developed by the MPO, could the second 10-year maintenance plan extend to 2026 for both TN and KY? He asked if EPA would require States to develop the maintenance plan out to 2030 instead of 2026 due to not having already submitted to EPA the second 10-year maintenance plan.

Ms. Spann said she didn't know but thinks 2026 matches how it has been done in the past based on statutes. The IAC could still wait for headquarters' guidance.

Mr. Corrigan asked what other options are available if the MPO can't meet the budgets?

Ms. Myers said that others who couldn't make their budget when transitioning between Mobile6 and MOVES models were able to allocate from their safety margin. This will require a SIP amendment and does take time.

Mr. Corrigan agreed this would be a better option over the development of a second 10 year maintenance plan. The problem is that if the emissions are not within reach of the safety margins, this would cause an extremely long delay and would likely cause a conformity lapse. He stated it was still important for the states to start on the second 10 year maintenance plan. The IAC was asked to concur to 2026 as the final year for the maintenance plans. The IAC will need a TDM network developed for 2026

Ms. Poff said relying on statute is a safe bet and that KYTC was good with 2026 as the final year for the maintenance plan.

Mr. Corrigan asked the IAC look at the planning assumptions, draft MTP and go over the pre-analysis for consensus plans before we reconvene the IAC. He asked Mr. Williams and Ms. Poff to coordinate with him to set up another IAC call in about one month. He asked Mr. Williams if he could have a pre-analysis consensus plan drafted by then.

Mr. Williams said yes, with his help.

Ms. Poff said to make sure there was enough time to gather the information before the next call in a month.

Mr. Corrigan suggested the call be before July 4, 2018.

There was no date set for the next IAC call. The call was ended.

Clarksville Urbanized Area
Metropolitan Planning Organization (CUAMPO)
Interagency Committee (IAC)
Conference Call Minutes
June 28, 2018 @ 1:00 pm

IAC Members Present:

Dianna Myers	EPA
Sean Santalla	FHWA-TN
Mike Claggett	FHWA
Bernadette Dupont	FHWA-KY
Deborah Fleming	TDOT
Justin Harrod	KYTC
Marc Corrigan	TDEC
Leslie Poff	KYDAQ
Anna Bowman	KYDAQ
Dr. Egide Louis	EPA
Vijay Kunada	Neel-Schaffer Consultant
Nicholas Broussard	Neel-Schaffer Consultant
Stan Williams	MPO
Jill Hall	MPO

Mr. Williams took roll and reviewed the schedule for the development of the 2045 MTP and the CDR. He stated that the draft MTP was sent to KYTC and TDOT for their 30 day review period. The MTP was received by both agencies on June 26, 2018 and the review will be until August 6th, per TDOT email.

Mr. Corrigan asked if the September 3rd date on the schedule for the IAC review of the CDR and the September 17th date for the federal review of the MTP could be consolidated for both to be reviewed beginning September 3rd to save some time. The new TIP will not be updated until late spring 2019 after the completion of the MTP and the CDR.

Mr. Santalla agreed with the consolidation of the September dates for the IAC and federal review of the documents. He reminded everyone that after the MPO adopts the documents on January 17, 2019 then FHWA has 30 days after the adoption along with EPA for a final review. This may cause a lapse. Mr. Williams agreed that it was a tight schedule and the lapse would begin in the middle of February if not approved.

Discussion of the MOVES modeling and the draft MTP review was led by Mr. Williams. He stated that changes to the MOVES inputs due to changes in project descriptions were expected to be minor. The MPO is small and the majority, if not all, of the projects have been modeled previously. There could be changes required to the draft MTP after the MOVES model is run. Ms. Fleming said that changes to the projects could come from the Programming office at TDOT with changes to termini of existing projects.

Mr. Corrigan asked FHWA and EPA members if they had heard that another action needs to be taken by the Court regarding the South Coast Decision to actually make the decision effective. Mr. Claggett and Ms. Myers had not heard this but would check with headquarters to confirm. Regardless, the MPO should proceed with the schedule and documents.

Mr. Williams spoke on item #3 on the agenda, the planning assumptions and data. He thanked Mr. Corrigan for putting the draft planning assumptions together and Mr. Kunada and Mr. Broussard for their continued work on the planning assumptions. Mr. Williams reviewed the planning assumption document and stated that KY and TN have separate budgets. He said there were no changes to the first page between Mr. Corrigan's draft and the consultants work to the draft. On the second page Section 1: Item 4) the date for the May 30th IAC call was added.

On the second page, Section 1: Item 3) Conformity Analysis Years, Mr. Corrigan asked if it was necessary to show conformity for 2016. He stated that his understanding was that conformity would apply only to future years. Ms. Myers agreed with Mr. Corrigan. She said that 2016 does not have to be an analysis year. The first analysis year is 2026. Mr. Williams stated that 2016 is the base year for the SE data the Plan is being update from.

Under Section 3: Emissions Model Assumptions, the consultants added the July weekday factors. Mr. Kunada used the average weekday factor provided to him by Lia Prince with TDOT. Mr. Corrigan, Mr. Kunada and Mr. Louis discussed the use of UT and/or TDOT factors since the MVEBs were developed using a typical July day, not weekday. To remain consistent with the SIP, we should consider using an average July day factor. Mr. Corrigan said he sent the UT data that included July day factors to Mr. Williams by email a day earlier. Ms. Hall forwarded the email with the UT data attached to Mr. Kunada. Mr. Corrigan stated that TDOT has developed the adjustment factor for all months, including July. Mr. Harrod said Kentucky used seasonal average week day and Mr. Williams said Tennessee used average July day in the last CDR. Mr. Kunada will double check the information from the existing budgets.

Mr. Louis said that all four types of fuel: gas, diesel, E85 and CNG should be included in the MOVES run specifications. Mr. Corrigan noted that if the AVFT is adjusted to account for the lack of CNG in the transit fleet and replaced with diesel (or other appropriate fuel) in the AVFT file, it should be OK to include or omit the CNG vehicles since the AVFT file should properly address the lack of CNG buses in the transit fleet. Mr. Louis asked Mr. Kunada to send him the files from the MOVES runs once it is finished running and he will review them.

Under Section 3: Items 9 and 10, Mr. Corrigan asked how the 'donut' area outside of the TDM are will have the VMT forecasted. Mr. Harrod said the Kentucky side is currently going through the Christian County model and updating to 2045 for the entire County. Once the model is run the report breaks out the area between the MPO area and the rest of Christian County. Mr. Williams said the Tennessee model represents all of Montgomery County.

Mr. Kunada reviewed Table 1. Proposed MOVES input Data for Montgomery County. The input data for Table 1was provided by TDOT, KYTC, TDEC and UT. Mr. Corrigan explained he had taken the Mobile6 inputs used in the original maintenance plan and ran them through EPA's converter for the meteorological data. Mr. Louis stressed to use MOVES2014a for emissions modeling. Mr. Corrigan suggested the use of the hour fractions that EPA developed if the TDM does not have the capability of developing reasonable hour VMT distribution factors. Mr. Corrigan stated that he emailed those to Ms. Hall for consideration, which were forwarded on to the consultants.

Item 4 on the agenda regarded discussion of the Second 10 Year Maintenance Plan and MVEB/SIP considerations. Mr. Corrigan stated that since EPA is not planning to appeal (confirmed by EPA on the call) the requirement for the second 10 year maintenance plans, the

states must develop the second 10 year maintenance plan and look at the budgets and safety margins. Mr. Corrigan explained that on the previous IAC call, some of the general planning assumptions had been discussed and agreed upon, for example the last year of the maintenance plan and the base year (2026 and 2014, respectively). Mr. Corrigan explained they needed discussion and agreement on some of the more detailed MOVES inputs.

Several MOVES inputs were discussed with the group, including using adjusted HPMS data for 2014 for VMT, as well as 2014 CRC A-100 data for hour fractions and speeds. Source type population data for 2014 would come from MOVEs inputs developed by UT for TDOT. Growth factors would be developed from TDM growth rates for various source types to establish out-year sourcetype populations.

One of the questions posed to EPA was: in the second 10 year maintenance plan, how do we address the existing budgets to 'remove' the old budgets? Will a new budget need to be established for 2016? Could a different year be used, say for example, 2014, to replace the existing 2016 MVEB? Ms. Myers said in order to address older budgets they would need to be updated with newer budgets in the maintenance plan. The new budgets, no matter the analysis years set, would supersede, the 2016 budget already established. Mr. Corrigan posed the question to the group: what year would we want another budget established for, if the 2016 budget was found to be insufficient? Ms. Poff said she would wait to see data to decide which budget year to use for KY.

Mr. Corrigan asked which year would be used to calculate safety margins from: either the 2004 base year or 2014. Ms. Myers said she thinks the base year will be 2004, but will research the question. Ms. Dupont asked if there was anything more recent. Mr. Corrigan said yes but the base year determines the emissions at which the area attained the NAAQS, and thus from that there is a 'reserve' if emissions have declined to use as addition to the MVEB.

There were no other questions or comments from the IAC attendees. Mr. Williams said the next call would be approximately four weeks from now. He will check with the IAC members on times and availability. The call ended.

Clarksville Urbanized Area
Metropolitan Planning Organization (CUAMPO)
Interagency Committee (IAC)
Conference Call Minutes
October 9, 2018 @ 10:30 am

IAC Members Present:

Deborah Fleming	TDOT
Marc Corrigan	TDEC
Vijay Kunada	Neel-Schaffer Consultant
Nicholas Broussard	Neel-Schaffer Consultant
Stan Williams	MPO
Jill Hall	MPO

Mr. Williams took roll and did a quick review of the schedule for the development of the 2045 MTP and the CDR.

The second item on the agenda was the review, discussion and concurrence on the project list. Mr. Williams said that as a result of the discussion with Mr. Broussard, that projects #507 and #508 will show a non-exempt status. He further explained that all of the projects on the list were included in the modeling. Ms. Fleming indicated that she also questioned the exempt status of projects #507 and #508 but that question has been addressed. Mr. Corrigan suggested that project #107 was small enough to be exempt but the project #507 and #508 appear to be non-exempt. Additionally, Mr. Corrigan stated that the project list needs to indicate the regional significance status of the projects.

The third item on the agenda was the discussion of any other comments on the Draft CDR and/or the Draft 2045 MTP. Mr. Corrigan asked to have included in the CDR all of the projects, even those that are groupings and transit projects included in the project list for the IAC to make determinations on the exempt and regional significance status. He had concerns related to regional significant projects that may not be shown. Mr. Williams stated that the funding for projects included in the grouping list is described in Chapter 9, pgs. 1 - 6 and the transit projects are in Chapter 10, pgs. 4-6 in the Draft 2045 MTP. Ms. Fleming asked if CTS may be building a new Transit Transfer Station, and does that need to be shown as a separate project. She indicated that Knoxville Transit built a downtown transit center a few years back and it had to be shown separately in the Plan and there was some type of analysis required. We can't assume that every transit project is exempt. Mr. Williams indicated that upon review of the transit list, he deemed said projects were exempt. Mr. Corrigan stressed that these projects needed to be enumerated in the list of projects (including applicable groupings) for the IAC to be able to make exempt and regional significance determinations. All agreed that the IAC needed to be able to comment on regionally significance determinations.

Item four on the agenda was a brief discussion on the updated interim guidance on conformity requirements for the 1997 Ozone NAQQs. Mr. Corrigan stated that it appears that amendments to the current Plan or TIP, including non-exempt status projects, appear to be able to move forward through the process so long as FHWA makes final determinations on them before February 16th, 2019. Mr. Williams stated that the two CMAQ projects (ITS and Transit) for the October 18th MPO meeting were both exempt. In addition, the two amendments (SR734) from the April 19th meeting were non-exempt thus sent back to TDOT and FHWA for review and approval.

Mr. Williams thanked everyone for their, hard work, participation and help to keep to the tight schedule. He stated that currently the documents are on schedule to be adopted in January 2019.

There were no other questions or comments from the IAC attendees. Mr. Williams said he would send out the minutes to the IAC for any additional comments. The call ended.

Clarksville Urbanized Area Metropolitan Planning Organization (CUAMPO)

Interagency Committee (IAC) Conference Call Minutes

December 7, 2018, 1:00 PM CST

Members Present:

Elizabeth Watkins	FHWA, TN Div.
Michael Claggett	FHWA,
Richard Wong	EPA, Reg. 4
Bernadette Dupont	FHWA, KY Div.
Dianna Myers	EPA, Reg. 4
Justin Harrod	KYTC
Kwabena Aboagye	TDOT
Marc Corrigan	TDEC
Nicholas Broussard	Neel-Schaffer, Inc.
Sean Santalla	FHWA, TN Div.
Vijay Kunada	Neel-Schaffer, Inc.
Stan Williams	CUAMPO

Mr. Williams took roll call and thanked everyone for their participation. He began with agenda item #2, update on comments received during the Federal and IAC review of the Draft 2045 Major Transportation Plan (MTP) and Conformity Determination Report CDR. These most recent revisions incorporate changes to project descriptions related to SR149 & SR374 from a proposed amendment to the 2017-2020 Transportation Improvement Program (TIP) back in April, 2018. As per Mr. Santalla October 22nd email, TDOT would not be able to move forward with the FONSI or other Federal actions on this project until the MTP, TIP and CDR are amended with the corrected project description/scope. Mr. Williams stated after a discussion with the consultants he decided to revise the Draft 2045 MTP and CDR. Thus the Travel Demand Model (TDM) and the MOVES emissions model were rerun; the results showed that with these changes, conformity with the emission budget was demonstrated. Mr. Santalla asked Mr. Corrigan if he had the opportunity to run the MOVES model. Mr. Corrigan replied that yes he had replicated some of the MOVES runs and drew the same conclusions.

The MTP, CDR and TIP amendment are scheduled to be adopted during the January Executive Board meeting. Mr. Corrigan suggested that these actions, amendment to the project description and scope, relating to SR149 & SR374, be represented in the comment and

responses documented in the Appendix of the MTP. In addition, he asked that the modeling files and input and output databases be made available to any member of the general public by means of a statement on the MPO's website or adding the files to the website. Mr. Williams confirmed they would be.

Ms. Dupont asked which of the MOVES version was utilized. Mr. Kunada stated it was MOVES2014a. The modeling began before the release of MOVES2014b. General discussion from the members indicated that was fine. Mr. Aboagye conveyed that after the documents were adopted at the January 17, 2019 MPO meeting, he would be delivering them to TN FHWA.

Previously, per Mr. Corrigan and Ms. Fleming suggestions, the list of all the projects with a determination of the projects' regional significance or exempt status was provided. Mr. Williams reminded the members that all of the non-exempt projects in the MTP have been modeled in MOVES as the members concurred. Mrs. Myers' request for specific text was added in paragraph 1.0, Background, in the CDR.

Mr. Santalla thanked Mr. Williams and all of the consultant team for all their efforts.

Appendix C: Pre-Analysis Consensus Plan

Clarksville Area Summary of Planning Assumptions Used in Regional Emissions Analysis for the 1997 8-hour Ozone NAAQS

On July 18, 1997, the Environmental Protection Agency (EPA) promulgated a revised 8-hour ozone standard of 0.08 parts per million (ppm). This new standard is more stringent than the previous 1-hour ozone standard (See 69 FR 23857). The EPA designated the Clarksville-Hopkinsville area (Montgomery County Tennessee and Christian County, Kentucky, see Figure 1) nonattainment for the 8-hour average ozone National Ambient Air Quality Standard (NAAQS) on April 30, 2004, effective June 15, 2004. The Clarksville area was designated a basic ozone nonattainment area, following designation under Subpart 1 of the 1990 Clean Air Act Amendments (Federal Register Notice published April 30, 2004).

On August 10, 2005, the State of Tennessee requested redesignation to attainment for the 8-hour ozone standard for the Montgomery County, Tennessee portion of the Clarksville-Hopkinsville 8-hour ozone area. The redesignation request included three years of complete, quality-assured ambient air quality data for the ozone seasons of 2002 through 2004, indicating the 8-hour ozone NAAQS had been achieved for the Clarksville-Hopkinsville area.

On September 22, 2005 the US EPA approved Tennessee's request for redesignation of the Tennessee portion (Montgomery County) of the Clarksville-Hopkinsville nonattainment area to attainment (183 FR 55559). The redesignation request had an effective date of November 21, 2005.

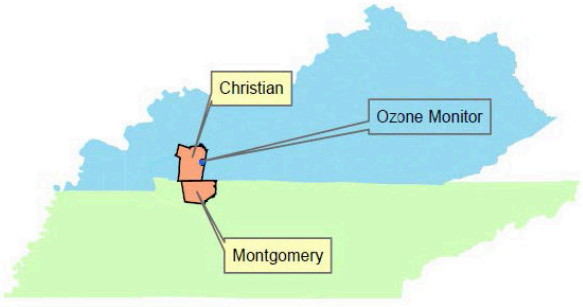

Figure 1. Clarksville–Hopkinsville TN-K

This document seeks to provide a detailed listing of the procedures and planning

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assumptions for the upcoming conformity analysis. This summary is submitted to Interagency Consultation (IAC) in accordance with Section 93.105(c)(1)(i) of the Transportation Conformity Rule which requires interagency review of the model(s) and associated methods and assumptions used in the regional emissions analysis. All assumptions apply to the LRTP, TIP, and conformity analysis documents.

An interagency consultation call was held May 30, 2018 to discuss some of the protocols and parameters outlined in this report. This report will be modified to reflect any modifications suggested as a part of the interagency consultation. Interagency consultation on methods and assumptions that affect the conformity analysis will continue to be an ongoing process.

Section 1: General Methods and Assumptions

1) Subject Plans
   a. 2045 Clarksville Area MPO Metropolitan Transportation Plan
   b. 2017-2020 Transportation Improvement Program

2) Conformity Test
   a. Analysis is conducted for NOx and VOCs.
   b. Determined using State Implementation Plan (SIP) 2016 motor vehicle emission budgets (MVEBs) for VOC and NOx established in the Federal Register, Vol. 183 FR 55559, September 22, 2005.
      i. VOC – 3.00 tons/day
      ii. NOx – 9.05 tons/day
   c. Emissions estimated using the methodology presented in Sections 3 and 4 of this memorandum.

3) Conformity Analysis Year(s)
   a. 2016, 2026, 2036, 2045
   b. Travel Demand Model will be run for all analysis years.

4) IAC Consensus on Planning Assumptions: Interagency call was held on May 30 and June 28, 2018 to discuss planning assumptions.

Section 2: Travel Demand Modeling and LRTP Assumptions

1) Base/Validation Year: 2016

2) Project Listing: Provided as a part of the Name of MTP 2045: Clarksville Urban Area MPO Long-Range Transportation Plan; includes
   a. Regionally Significant and Federally Funded
   b. Regionally Significant and Non-Federally Funded
   c. Conforms to Federal SAFETEA-LU guidelines, including a fiscally constrained Travel Demand Model is state of the practice and described in a separate document.

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3) Demographic Data: Provided in a separate document

4) Transit Modeling
   a. Transit mode split is estimated using trip end mode choice
      i. Estimates trips from the person trips developed in trip generation
      ii. Determines transit-oriented person trips prior to conversion of region's person trips to vehicle trips

Section 3: Emissions Model Assumptions

1. Emission Factor Model: MOVES2014a
2. Pollutants: NOx, and VOC.
3. Geographic area: Montgomery County.
4. Base Year: 2016
5. Final year: 2045
6. Interim horizon years: 2026, 2036
7. Typical summer day VMT may need to be developed by means of an adjustment factor applied to TDM output.
   i. Adjustment factors are shown in the table below:

Function Class	Region	Average July Ozone Season Weekday Factor
Freeway	Rural	0.963
Arterial	Rural	0.960
Ramp	Rural	0.960
Local	Rural	0.960
Interstate	Urban	0.957
Freeway	Urban	0.957
Arterial	Urban	0.957
Ramp	Urban	0.957
Local	Urban	0.957

Source: TDOT

8. Calculated for Year 2016:
   a. Reflects Section 93.122(b)(3) of the Transportation Conformity Rule which recommends that HPMS adjustment factors be developed to reconcile travel model estimates of VMT in base year of validation

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(2016) to HPMS estimates for the same period.
b. Compare 2016 base year travel demand model with 2016 HPMS to obtain HPMS scaling factor
    i. 2016 base year travel demand model was validated using 2016 HPMS data

9. Reconcile travel demand model functional classifications with functional classifications available in MOVES
    a. Combine Travel Demand Model classes into applicable MOVES urban classes
    b. Combine Travel Demand Model classes into applicable MOVES rural classes

10. Obtain Daily Vehicle Miles Traveled (DVMT) from the travel demand model for all MOVES functional classifications. Local road DVMT will be determined from HPMS data.
    a. The percentage of local road DVMT in the 2016 base year will be applied to all future years
    b. Ramp VHT will be determined using travel demand model data

11. Apply HPMS scaling factor to DVMTs to obtain HPMS-adjusted DVMTs for each model year.

Section 4: MOVES Runspec Development:

- Scale: County level scale – Inventory mode
- Vehicles/Equipment: Gasoline and diesel fuels, all vehicle combinations (the AVFT file needs to be edited to remove CNG to hybrid diesel from the transit bus fleet)
- Road type: All
- Pollutants and Processes: NOx and VOC and any supporting pollutants. Uncheck the Re-Fueling Displacement Locks and Spilling Loss
- Output:
    - General:
        - Units: grams, joules, miles;
        - Activity: Distance Traveled, Population
    - Output Emissions Detail:
        - On road: Road Type, Source Use Type

Table 1 lists the inputs needed to populate the County Data manager in MOVES.

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Table 1. Proposed MOVES Input Data for Montgomery County.

	Input Data Requirement:	Source:	Comments:
1.	Road type distribution: VMT fractions by road type.	Data from TDM for other year(s)?	In the base year, the TDM values will be compared to the 2016 HPMS data to develop VMT adjustment factors for the TDM. These adjustment factors will be applied to the forecast TDM volumes to generate future year VMTs. Forecast donut area VMTs will be developed based on the ratio of donut VMTs to model area VMTs in the base year.
2.	Source type population: number of vehicles in the area to be modeled.	sourceType Population: Data developed by TDOT from Dept. of Revenue data for 2014. How do we generate future populations? Use TDM vehicle ownership submodel to grow some source types, and employment growth for commercial vehicles?	The TDM can be used to determine the growth in personal automobiles, commercial vehicles, and trucks for each model year. These vehicles would then be allocated to the source types they belong to.
3.	Vehicle type VMT (several different types): 1. VMT by 5 HPMS vehicle types (HPMSvTypeYear) 2. VMT fraction by hour by road type and sourcetype.	Can 2016 HPMS can be adjusted to summer day from HPMS data; will this be calibrated to TDM? Hour fractions can be developed from the TDM	The HPMS data can be calibrated using VMT/ADT adjustment factors provided by TDOT and KYTC. TDM calibrations are based on the HPMS data. Hour fractions have been provided through the UT data.
4.	I/M Programs	NA	
5.	Age distribution: 1 to 30 years for MOVES source types (13 types).	UT data available for 2014. Assume same age distribution for all future years.	This data can be used as-is and was received from TDEC.

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6.	Average speed distribution: fraction of driving time in each speed bin for each sourcetype by roadtype for each hour of the day.	Obtained from TDM.	NSI will develop this data for all four analysis years using the TDM. INRIX data will be used to compare base year TDM speeds to NPMRDS data to develop speed adjustment factors for future years.
7.	Fuel supply and formulation information if different from default information.	For historical years, use the MOVES defaults since it is based on sampling data. For future years, develop 'worst case' fuel formulations (maximum RVP) as per EPA guidance.	TDEC has provided this data.
8.	Meteorological data: temperature and humidity for each hour of the day for a typical day in the month.	Convert current MOBILE6.2 values in the SIP using EPA's Meteorologicaldataconverter_mobile6.xls.	TDEC has provided this data.
9.	Ramp fraction: percent VHT on the ramp for controlled access facilities.	Obtain from TDM.	NSI will develop this data for each analysis year using the TDM.

Appendix D: MOVES Model Inputs

Table D-1: Road Type Distribution by Year

sourceTypeID	roadTypeID	roadTypeVMTFraction		
		2026	2036	2045
11	1	0.0000	0.0000	0.0000
11	2	0.3375	0.3414	0.3401
11	3	0.2789	0.2732	0.2663
11	4	0.0402	0.0404	0.0398
11	5	0.3434	0.3450	0.3538
21	1	0.0000	0.0000	0.0000
21	2	0.3375	0.3414	0.3401
21	3	0.2789	0.2732	0.2663
21	4	0.0402	0.0404	0.0398
21	5	0.3434	0.3450	0.3538
31	1	0.0000	0.0000	0.0000
31	2	0.3375	0.3414	0.3401
31	3	0.2789	0.2732	0.2663
31	4	0.0402	0.0404	0.0398
31	5	0.3434	0.3450	0.3538
32	1	0.0000	0.0000	0.0000
32	2	0.3375	0.3414	0.3401
32	3	0.2789	0.2732	0.2663
32	4	0.0402	0.0404	0.0398
32	5	0.3434	0.3450	0.3538
41	1	0.0000	0.0000	0.0000
41	2	0.3375	0.3414	0.3401
41	3	0.2789	0.2732	0.2663
41	4	0.0402	0.0404	0.0398
41	5	0.3434	0.3450	0.3538
42	1	0.0000	0.0000	0.0000
42	2	0.3375	0.3414	0.3401
42	3	0.2789	0.2732	0.2663
42	4	0.0402	0.0404	0.0398
42	5	0.3434	0.3450	0.3538
43	1	0.0000	0.0000	0.0000
43	2	0.3375	0.3414	0.3401
43	3	0.2789	0.2732	0.2663
43	4	0.0402	0.0404	0.0398
43	5	0.3434	0.3450	0.3538
51	1	0.0000	0.0000	0.0000
51	2	0.3375	0.3414	0.3401
51	3	0.2789	0.2732	0.2663
51	4	0.0402	0.0404	0.0398

sourceTypeID	roadTypeID	roadTypeVMTFraction		
		2026	2036	2045
51	5	0.3434	0.3450	0.3538
52	1	0.0000	0.0000	0.0000
52	2	0.3375	0.3414	0.3401
52	3	0.2789	0.2732	0.2663
52	4	0.0402	0.0404	0.0398
52	5	0.3434	0.3450	0.3538
53	1	0.0000	0.0000	0.0000
53	2	0.3375	0.3414	0.3401
53	3	0.2789	0.2732	0.2663
53	4	0.0402	0.0404	0.0398
53	5	0.3434	0.3450	0.3538
54	1	0.0000	0.0000	0.0000
54	2	0.3375	0.3414	0.3401
54	3	0.2789	0.2732	0.2663
54	4	0.0402	0.0404	0.0398
54	5	0.3434	0.3450	0.3538
61	1	0.0000	0.0000	0.0000
61	2	0.3375	0.3414	0.3401
61	3	0.2789	0.2732	0.2663
61	4	0.0402	0.0404	0.0398
61	5	0.3434	0.3450	0.3538
62	1	0.0000	0.0000	0.0000
62	2	0.3375	0.3414	0.3401
62	3	0.2789	0.2732	0.2663
62	4	0.0402	0.0404	0.0398
62	5	0.3434	0.3450	0.3538

Table D-2: Source Type Population by Year

sourceTypeID	sourceTypePopulation		
	2026	2036	2045
11	1,507	1,657	1,823
21	23,469	25,816	28,398
31	24,410	26,851	29,536
32	2,394	2,633	2,896
41	9	10	11
42	219	241	265
43	105	116	128
51	28	31	34
52	938	1,032	1,135
53	70	77	85
54	79	87	96
61	420	462	508
62	322	354	389

Table D-3: Vehicle Age Distribution by Year

sourceTypeID	ageID	ageFraction		
		2026	2036	2045
11	0	0.0037	0.0037	0.0037
11	1	0.0478	0.0478	0.0478
11	2	0.0522	0.0522	0.0522
11	3	0.0448	0.0448	0.0448
11	4	0.0366	0.0366	0.0366
11	5	0.0216	0.0216	0.0216
11	6	0.0612	0.0612	0.0612
11	7	0.0567	0.0567	0.0567
11	8	0.0769	0.0769	0.0769
11	9	0.0754	0.0754	0.0754
11	10	0.0769	0.0769	0.0769
11	11	0.0515	0.0515	0.0515
11	12	0.0858	0.0858	0.0858
11	13	0.0590	0.0590	0.0590
11	14	0.0507	0.0507	0.0507
11	15	0.0396	0.0396	0.0396
11	16	0.0231	0.0231	0.0231
11	17	0.0209	0.0209	0.0209
11	18	0.0179	0.0179	0.0179
11	19	0.0157	0.0157	0.0157

sourceTypeID	ageID	ageFraction		
		2026	2036	2045
11	20	0.0187	0.0187	0.0187
11	21	0.0112	0.0112	0.0112
11	22	0.0090	0.0090	0.0090
11	23	0.0060	0.0060	0.0060
11	24	0.0022	0.0022	0.0022
11	25	0.0022	0.0022	0.0022
11	26	0.0067	0.0067	0.0067
11	27	0.0030	0.0030	0.0030
11	28	0.0075	0.0075	0.0075
11	29	0.0082	0.0082	0.0082
11	30	0.0075	0.0075	0.0075
21	0	0.0081	0.0081	0.0081
21	1	0.0421	0.0421	0.0421
21	2	0.0407	0.0407	0.0407
21	3	0.0493	0.0493	0.0493
21	4	0.0383	0.0383	0.0383
21	5	0.0408	0.0408	0.0408
21	6	0.0369	0.0369	0.0369
21	7	0.0434	0.0434	0.0434
21	8	0.0481	0.0481	0.0481
21	9	0.0456	0.0456	0.0456
21	10	0.0477	0.0477	0.0477
21	11	0.0460	0.0460	0.0460
21	12	0.0468	0.0468	0.0468
21	13	0.0423	0.0423	0.0423
21	14	0.0429	0.0429	0.0429
21	15	0.0417	0.0417	0.0417
21	16	0.0344	0.0344	0.0344
21	17	0.1850	0.1850	0.1850
21	18	0.0221	0.0221	0.0221
21	19	0.0198	0.0198	0.0198
21	20	0.0166	0.0166	0.0166
21	21	0.0088	0.0088	0.0088
21	22	0.0156	0.0156	0.0156
21	23	0.0085	0.0085	0.0085
21	24	0.0071	0.0071	0.0071
21	25	0.0052	0.0052	0.0052
21	26	0.0041	0.0041	0.0041
21	27	0.0036	0.0036	0.0036
21	28	0.0039	0.0039	0.0039
21	29	0.0021	0.0021	0.0021

sourceTypeID	ageID	ageFraction		
		2026	2036	2045
21	30	0.0025	0.0025	0.0025
31	0	0.0115	0.0115	0.0115
31	1	0.0453	0.0453	0.0453
31	2	0.0421	0.0421	0.0421
31	3	0.0460	0.0460	0.0460
31	4	0.0419	0.0419	0.0419
31	5	0.0388	0.0388	0.0388
31	6	0.0288	0.0288	0.0288
31	7	0.0470	0.0470	0.0470
31	8	0.0552	0.0552	0.0552
31	9	0.0514	0.0514	0.0514
31	10	0.0588	0.0588	0.0588
31	11	0.0630	0.0630	0.0630
31	12	0.0546	0.0546	0.0546
31	13	0.0529	0.0529	0.0529
31	14	0.0477	0.0477	0.0477
31	15	0.0327	0.0327	0.0327
31	16	0.0478	0.0478	0.0478
31	17	0.0411	0.0411	0.0411
31	18	0.0330	0.0330	0.0330
31	19	0.0224	0.0224	0.0224
31	20	0.0271	0.0271	0.0271
31	21	0.0245	0.0245	0.0245
31	22	0.0171	0.0171	0.0171
31	23	0.0125	0.0125	0.0125
31	24	0.0111	0.0111	0.0111
31	25	0.0101	0.0101	0.0101
31	26	0.0098	0.0098	0.0098
31	27	0.0092	0.0092	0.0092
31	28	0.0056	0.0056	0.0056
31	29	0.0064	0.0064	0.0064
31	30	0.0045	0.0045	0.0045
32	0	0.0117	0.0117	0.0117
32	1	0.0442	0.0442	0.0442
32	2	0.0414	0.0414	0.0414
32	3	0.0463	0.0463	0.0463
32	4	0.0409	0.0409	0.0409
32	5	0.0361	0.0361	0.0361
32	6	0.0272	0.0272	0.0272
32	7	0.0474	0.0474	0.0474
32	8	0.0537	0.0537	0.0537

sourceTypeID	ageID	ageFraction		
		2026	2036	2045
32	9	0.0527	0.0527	0.0527
32	10	0.0589	0.0589	0.0589
32	11	0.0638	0.0638	0.0638
32	12	0.0550	0.0550	0.0550
32	13	0.0519	0.0519	0.0519
32	14	0.0474	0.0474	0.0474
32	15	0.0335	0.0335	0.0335
32	16	0.0484	0.0484	0.0484
32	17	0.0380	0.0380	0.0380
32	18	0.0334	0.0334	0.0334
32	19	0.0235	0.0235	0.0235
32	20	0.0288	0.0288	0.0288
32	21	0.0254	0.0254	0.0254
32	22	0.0182	0.0182	0.0182
32	23	0.0133	0.0133	0.0133
32	24	0.0112	0.0112	0.0112
32	25	0.0108	0.0108	0.0108
32	26	0.0104	0.0104	0.0104
32	27	0.0096	0.0096	0.0096
32	28	0.0057	0.0057	0.0057
32	29	0.0065	0.0065	0.0065
32	30	0.0050	0.0050	0.0050
41	0	0.0375	0.0375	0.0375
41	1	0.0250	0.0250	0.0250
41	2	0.0250	0.0250	0.0250
41	3	0.0250	0.0250	0.0250
41	4	0.0375	0.0375	0.0375
41	5	0.0375	0.0375	0.0375
41	6	0.0375	0.0375	0.0375
41	7	0.0500	0.0500	0.0500
41	8	0.0500	0.0500	0.0500
41	9	0.0500	0.0500	0.0500
41	10	0.0375	0.0375	0.0375
41	11	0.0375	0.0375	0.0375
41	12	0.0000	0.0000	0.0000
41	13	0.0375	0.0375	0.0375
41	14	0.0375	0.0375	0.0375
41	15	0.0375	0.0375	0.0375
41	16	0.0500	0.0500	0.0500
41	17	0.0125	0.0125	0.0125
41	18	0.0625	0.0625	0.0625

sourceTypeID	ageID	ageFraction		
		2026	2036	2045
41	19	0.0000	0.0000	0.0000
41	20	0.0750	0.0750	0.0750
41	21	0.0875	0.0875	0.0875
41	22	0.0250	0.0250	0.0250
41	23	0.0750	0.0750	0.0750
41	24	0.0125	0.0125	0.0125
41	25	0.0250	0.0250	0.0250
41	26	0.0125	0.0125	0.0125
41	27	0.0000	0.0000	0.0000
41	28	0.0000	0.0000	0.0000
41	29	0.0000	0.0000	0.0000
41	30	0.0000	0.0000	0.0000
42	0	0.0375	0.0375	0.0375
42	1	0.0250	0.0250	0.0250
42	2	0.0250	0.0250	0.0250
42	3	0.0250	0.0250	0.0250
42	4	0.0375	0.0375	0.0375
42	5	0.0375	0.0375	0.0375
42	6	0.0375	0.0375	0.0375
42	7	0.0500	0.0500	0.0500
42	8	0.0500	0.0500	0.0500
42	9	0.0500	0.0500	0.0500
42	10	0.0375	0.0375	0.0375
42	11	0.0375	0.0375	0.0375
42	12	0.0000	0.0000	0.0000
42	13	0.0375	0.0375	0.0375
42	14	0.0375	0.0375	0.0375
42	15	0.0375	0.0375	0.0375
42	16	0.0500	0.0500	0.0500
42	17	0.0125	0.0125	0.0125
42	18	0.0625	0.0625	0.0625
42	19	0.0000	0.0000	0.0000
42	20	0.0750	0.0750	0.0750
42	21	0.0875	0.0875	0.0875
42	22	0.0250	0.0250	0.0250
42	23	0.0750	0.0750	0.0750
42	24	0.0125	0.0125	0.0125
42	25	0.0250	0.0250	0.0250
42	26	0.0125	0.0125	0.0125
42	27	0.0000	0.0000	0.0000
42	28	0.0000	0.0000	0.0000

sourceTypeID	ageID	ageFraction		
		2026	2036	2045
42	29	0.0000	0.0000	0.0000
42	30	0.0000	0.0000	0.0000
43	0	0.0283	0.0283	0.0283
43	1	0.0189	0.0189	0.0189
43	2	0.0240	0.0240	0.0240
43	3	0.0189	0.0189	0.0189
43	4	0.0332	0.0332	0.0332
43	5	0.0330	0.0330	0.0330
43	6	0.0236	0.0236	0.0236
43	7	0.0378	0.0378	0.0378
43	8	0.0425	0.0425	0.0425
43	9	0.0330	0.0330	0.0330
43	10	0.0334	0.0334	0.0334
43	11	0.0244	0.0244	0.0244
43	12	0.0051	0.0051	0.0051
43	13	0.0242	0.0242	0.0242
43	14	0.0285	0.0285	0.0285
43	15	0.0296	0.0296	0.0296
43	16	0.0434	0.0434	0.0434
43	17	0.0066	0.0066	0.0066
43	18	0.0525	0.0525	0.0525
43	19	0.0051	0.0051	0.0051
43	20	0.0665	0.0665	0.0665
43	21	0.0759	0.0759	0.0759
43	22	0.0151	0.0151	0.0151
43	23	0.0616	0.0616	0.0616
43	24	0.0051	0.0051	0.0051
43	25	0.0193	0.0193	0.0193
43	26	0.0102	0.0102	0.0102
43	27	0.0380	0.0380	0.0380
43	28	0.0525	0.0525	0.0525
43	29	0.0480	0.0480	0.0480
43	30	0.0619	0.0619	0.0619
51	0	0.0123	0.0123	0.0123
51	1	0.0119	0.0119	0.0119
51	2	0.0075	0.0075	0.0075
51	3	0.0083	0.0083	0.0083
51	4	0.0070	0.0070	0.0070
51	5	0.0053	0.0053	0.0053
51	6	0.0040	0.0040	0.0040
51	7	0.0057	0.0057	0.0057

sourceTypeID	ageID	ageFraction		
		2026	2036	2045
51	8	0.0290	0.0290	0.0290
51	9	0.0237	0.0237	0.0237
51	10	0.0233	0.0233	0.0233
51	11	0.0211	0.0211	0.0211
51	12	0.0167	0.0167	0.0167
51	13	0.0167	0.0167	0.0167
51	14	0.0281	0.0281	0.0281
51	15	0.0378	0.0378	0.0378
51	16	0.0426	0.0426	0.0426
51	17	0.0233	0.0233	0.0233
51	18	0.0272	0.0272	0.0272
51	19	0.0294	0.0294	0.0294
51	20	0.0123	0.0123	0.0123
51	21	0.0277	0.0277	0.0277
51	22	0.0277	0.0277	0.0277
51	23	0.1287	0.1287	0.1287
51	24	0.0931	0.0931	0.0931
51	25	0.0180	0.0180	0.0180
51	26	0.0158	0.0158	0.0158
51	27	0.0268	0.0268	0.0268
51	28	0.0141	0.0141	0.0141
51	29	0.0176	0.0176	0.0176
51	30	0.2373	0.2373	0.2373
52	0	0.0070	0.0070	0.0070
52	1	0.0056	0.0056	0.0056
52	2	0.0054	0.0054	0.0054
52	3	0.0096	0.0096	0.0096
52	4	0.0065	0.0065	0.0065
52	5	0.0077	0.0077	0.0077
52	6	0.0037	0.0037	0.0037
52	7	0.0072	0.0072	0.0072
52	8	0.0188	0.0188	0.0188
52	9	0.0250	0.0250	0.0250
52	10	0.0202	0.0202	0.0202
52	11	0.0189	0.0189	0.0189
52	12	0.0168	0.0168	0.0168
52	13	0.0162	0.0162	0.0162
52	14	0.0234	0.0234	0.0234
52	15	0.0351	0.0351	0.0351
52	16	0.0361	0.0361	0.0361
52	17	0.0325	0.0325	0.0325

sourceTypeID	ageID	ageFraction		
		2026	2036	2045
52	18	0.0206	0.0206	0.0206
52	19	0.0199	0.0199	0.0199
52	20	0.0273	0.0273	0.0273
52	21	0.0233	0.0233	0.0233
52	22	0.0217	0.0217	0.0217
52	23	0.2344	0.2344	0.2344
52	24	0.1553	0.1553	0.1553
52	25	0.0166	0.0166	0.0166
52	26	0.0153	0.0153	0.0153
52	27	0.0167	0.0167	0.0167
52	28	0.0124	0.0124	0.0124
52	29	0.0174	0.0174	0.0174
52	30	0.1236	0.1236	0.1236
53	0	0.0065	0.0065	0.0065
53	1	0.0051	0.0051	0.0051
53	2	0.0044	0.0044	0.0044
53	3	0.0102	0.0102	0.0102
53	4	0.0062	0.0062	0.0062
53	5	0.0083	0.0083	0.0083
53	6	0.0038	0.0038	0.0038
53	7	0.0076	0.0076	0.0076
53	8	0.0184	0.0184	0.0184
53	9	0.0262	0.0262	0.0262
53	10	0.0197	0.0197	0.0197
53	11	0.0175	0.0175	0.0175
53	12	0.0165	0.0165	0.0165
53	13	0.0154	0.0154	0.0154
53	14	0.0233	0.0233	0.0233
53	15	0.0329	0.0329	0.0329
53	16	0.0345	0.0345	0.0345
53	17	0.0300	0.0300	0.0300
53	18	0.0192	0.0192	0.0192
53	19	0.0187	0.0187	0.0187
53	20	0.0270	0.0270	0.0270
53	21	0.0229	0.0229	0.0229
53	22	0.0195	0.0195	0.0195
53	23	0.2558	0.2558	0.2558
53	24	0.1680	0.1680	0.1680
53	25	0.0162	0.0162	0.0162
53	26	0.0140	0.0140	0.0140
53	27	0.0157	0.0157	0.0157

sourceTypeID	ageID	ageFraction		
		2026	2036	2045
53	28	0.0113	0.0113	0.0113
53	29	0.0162	0.0162	0.0162
53	30	0.1090	0.1090	0.1090
54	0	0.0020	0.0020	0.0020
54	1	0.0010	0.0010	0.0010
54	2	0.0076	0.0076	0.0076
54	3	0.0090	0.0090	0.0090
54	4	0.0073	0.0073	0.0073
54	5	0.0080	0.0080	0.0080
54	6	0.0030	0.0030	0.0030
54	7	0.0070	0.0070	0.0070
54	8	0.0100	0.0100	0.0100
54	9	0.0226	0.0226	0.0226
54	10	0.0196	0.0196	0.0196
54	11	0.0232	0.0232	0.0232
54	12	0.0186	0.0186	0.0186
54	13	0.0199	0.0199	0.0199
54	14	0.0193	0.0193	0.0193
54	15	0.0431	0.0431	0.0431
54	16	0.0375	0.0375	0.0375
54	17	0.0540	0.0540	0.0540
54	18	0.0199	0.0199	0.0199
54	19	0.0156	0.0156	0.0156
54	20	0.0246	0.0246	0.0246
54	21	0.0216	0.0216	0.0216
54	22	0.0255	0.0255	0.0255
54	23	0.2671	0.2671	0.2671
54	24	0.1751	0.1751	0.1751
54	25	0.0176	0.0176	0.0176
54	26	0.0212	0.0212	0.0212
54	27	0.0103	0.0103	0.0103
54	28	0.0159	0.0159	0.0159
54	29	0.0232	0.0232	0.0232
54	30	0.0492	0.0492	0.0492
61	0	0.0144	0.0144	0.0144
61	1	0.0127	0.0127	0.0127
61	2	0.0080	0.0080	0.0080
61	3	0.0075	0.0075	0.0075
61	4	0.0070	0.0070	0.0070
61	5	0.0043	0.0043	0.0043
61	6	0.0038	0.0038	0.0038

sourceTypeID	ageID	ageFraction		
		2026	2036	2045
61	7	0.0050	0.0050	0.0050
61	8	0.0298	0.0298	0.0298
61	9	0.0211	0.0211	0.0211
61	10	0.0231	0.0231	0.0231
61	11	0.0213	0.0213	0.0213
61	12	0.0161	0.0161	0.0161
61	13	0.0165	0.0165	0.0165
61	14	0.0278	0.0278	0.0278
61	15	0.0378	0.0378	0.0378
61	16	0.0428	0.0428	0.0428
61	17	0.0223	0.0223	0.0223
61	18	0.0280	0.0280	0.0280
61	19	0.0305	0.0305	0.0305
61	20	0.0318	0.0318	0.0318
61	21	0.0275	0.0275	0.0275
61	22	0.0287	0.0287	0.0287
61	23	0.0934	0.0934	0.0934
61	24	0.0716	0.0716	0.0716
61	25	0.0177	0.0177	0.0177
61	26	0.0159	0.0159	0.0159
61	27	0.0280	0.0280	0.0280
61	28	0.0143	0.0143	0.0143
61	29	0.0175	0.0175	0.0175
61	30	0.2739	0.2739	0.2739
62	0	0.0164	0.0164	0.0164
62	1	0.0147	0.0147	0.0147
62	2	0.0091	0.0091	0.0091
62	3	0.0066	0.0066	0.0066
62	4	0.0072	0.0072	0.0072
62	5	0.0031	0.0031	0.0031
62	6	0.0037	0.0037	0.0037
62	7	0.0041	0.0041	0.0041
62	8	0.0325	0.0325	0.0325
62	9	0.0193	0.0193	0.0193
62	10	0.0239	0.0239	0.0239
62	11	0.0224	0.0224	0.0224
62	12	0.0159	0.0159	0.0159
62	13	0.0168	0.0168	0.0168
62	14	0.0287	0.0287	0.0287
62	15	0.0392	0.0392	0.0392
62	16	0.0449	0.0449	0.0449

sourceTypeID	ageID	ageFraction		
		2026	2036	2045
62	17	0.0208	0.0208	0.0208
62	18	0.0303	0.0303	0.0303
62	19	0.0335	0.0335	0.0335
62	20	0.0324	0.0324	0.0324
62	21	0.0286	0.0286	0.0286
62	22	0.0313	0.0313	0.0313
62	23	0.0454	0.0454	0.0454
62	24	0.0429	0.0429	0.0429
62	25	0.0180	0.0180	0.0180
62	26	0.0166	0.0166	0.0166
62	27	0.0311	0.0311	0.0311
62	28	0.0152	0.0152	0.0152
62	29	0.0179	0.0179	0.0179
62	30	0.3277	0.3277	0.3277

Table D-4: Annual VMT by Year

HPMSVtypeID	Daily VMT		
	2026	2036	2045
10	1,580,553	1,670,385	1,782,082
25	832,521,553	880,207,365	938,914,583
40	640,910	680,556	728,220
50	24,060,532	25,447,280	27,146,720
60	42,809,558	45,253,803	48,243,392

Table D-5: Ramp Fraction by Year

roadTypeID	rampFraction		
	2026	2036	2045
2	0.0800	0.0800	0.0800
4	0.0000	0.0000	0.0000

Table D-6: Humidity and Temperature

monthID	zoneID	HourID	temperature	relHumidity
7	210470	1	72.9	63.3
7	210470	2	71.3	66.7
7	210470	3	70.0	69.6
7	210470	4	69.1	71.8
7	210470	5	68.5	73.5
7	210470	6	67.7	75.5
7	210470	7	67.0	77.3
7	210470	8	67.6	75.8
7	210470	9	70.9	67.5
7	210470	10	76.3	56.3
7	210470	11	81.9	47.0
7	210470	12	86.6	40.3
7	210470	13	90.7	35.4
7	210470	14	93.0	33.0
7	210470	15	93.8	32.2
7	210470	16	94.0	32.0
7	210470	17	93.4	32.5
7	210470	18	91.9	34.1
7	210470	19	89.2	37.2
7	210470	20	85.7	41.5
7	210470	21	82.2	46.4
7	210470	22	79.2	51.3
7	210470	23	77.0	55.0
7	210470	24	74.9	59.1

Table D-7: Fuel Supply

fuelRegionID	fuelYearID	monthGroupID	fuelFormulationID	marketShare	marketShareCV
2026					
200000000	2026	7	90	1.000000	0.5
200000000	2026	7	4631	0.881478	0.5
200000000	2026	7	4633	0.118522	0.5
200000000	2026	7	25005	1.000000	0.5
200000000	2026	7	27002	1.000000	0.5
200000000	2026	7	28001	1.000000	0.5
2036					
200000000	2036	7	90	1.000000	0.5
200000000	2036	7	5921	0.716553	0.5
200000000	2036	7	5923	0.283447	0.5
200000000	2036	7	25005	1.000000	0.5
200000000	2036	7	27002	1.000000	0.5
200000000	2036	7	28001	1.000000	0.5
2045					
200000000	2045	7	90	1.000000	0.5
200000000	2045	7	7082	0.618510	0.5
200000000	2045	7	7084	0.381490	0.5
200000000	2045	7	25005	1.000000	0.5
200000000	2045	7	27002	1.000000	0.5
200000000	2045	7	28001	1.000000	0.5

Table D-8: Fuel Formulation

Fuel Forumla-tion ID	Fuel Subtypel D	RVP	Sulfur Level	ETOH Volume	MTBE Volume	ETBE Volume	TAME Volume	Aromatic Content	Olefin Content	Benzene Content	e200	e300	BioDiesel EsterVolume	Cetane Index	PAH Content	T50	T90
2026																	
10	10	6.9	30	0	0	0	0	26.1	5.6	1	41.09	83.09	0	0	0	218	329
20	20	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	30	0	7.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
50	51	7.7	11	85	0	0	0	0	0	0	49.9	89.5	0	0	0	200	300
90	90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
96	10	8.7	338	0	0	0	0	26.4	11.9	1.64	50	83	0	0	0	199.816	329.409
97	10	6.6	150	0	11.7581	0	0	24	11	0.8	52	84	0	0	0	195.735	324.864
98	10	6.9	30	0	0	0	0	26.1	5.6	1	41.09	83.09	0	0	0	218	329
99	10	6.9	90	0	0	0	0	26.1	5.6	1	41.09	83.09	0	0	0	218	329
4631	12	9.7	10	10	0	0	0	23.4	6.67	0.63	50.76	82.68	0	0	0	198.18	330.86
4633	15	8.7	10	15	0	0	0	22.06	5.49	0.63	56.89	83.2	0	0	0	185.75	328.49
25005	21	0	15	0	0	0	0	0	0	0	0	0	5	0	0	0	0
27002	51	7.7	8	74	0	0	0	0	0	0	49.9	89.5	0	0	0	200	300
28001	30	0	7.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2036																	
10	10	6.9	30	0	0	0	0	26.1	5.6	1	41.09	83.09	0	0	0	218	329
20	20	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	30	0	7.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
50	51	7.7	11	85	0	0	0	0	0	0	49.9	89.5	0	0	0	200	300
90	90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
96	10	8.7	338	0	0	0	0	26.4	11.9	1.64	50	83	0	0	0	199.816	329.409
97	10	6.6	150	0	11.7581	0	0	24	11	0.8	52	84	0	0	0	195.735	324.864
98	10	6.9	30	0	0	0	0	26.1	5.6	1	41.09	83.09	0	0	0	218	329
99	10	6.9	90	0	0	0	0	26.1	5.6	1	41.09	83.09	0	0	0	218	329
5921	12	9.7	10	10	0	0	0	23.4	6.67	0.63	50.76	82.68	0	0	0	198.18	330.86

Fuel Forumla-tion ID	Fuel Subtypel D	RVP	Sulfur Level	ETOH Volume	MTBE Volume	ETBE Volume	TAME Volume	Aromatic Content	Olefin Content	Benzene Content	e200	e300	BioDiesel EsterVolume	Cetane Index	PAH Content	T50	T90
5923	15	8.7	10	15	0	0	0	22.06	5.49	0.63	56.89	83.2	0	0	0	185.75	328.49
25005	21	0	15	0	0	0	0	0	0	0	0	0	5	0	0	0	0
27002	51	7.7	8	74	0	0	0	0	0	0	49.9	89.5	0	0	0	200	300
28001	30	0	7.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2045																	
10	10	6.9	30	0	0	0	0	26.1	5.6	1	41.09	83.09	0	0	0	218	329
20	20	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	30	0	7.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
50	51	7.7	11	85	0	0	0	0	0	0	49.9	89.5	0	0	0	200	300
90	90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
96	10	8.7	338	0	0	0	0	26.4	11.9	1.64	50	83	0	0	0	199.816	329.409
97	10	6.6	150	0	11.7581	0	0	24	11	0.8	52	84	0	0	0	195.735	324.864
98	10	6.9	30	0	0	0	0	26.1	5.6	1	41.09	83.09	0	0	0	218	329
99	10	6.9	90	0	0	0	0	26.1	5.6	1	41.09	83.09	0	0	0	218	329
7082	12	9.7	10	10	0	0	0	23.4	6.67	0.63	50.76	82.68	0	0	0	198.18	330.86
7084	15	8.7	10	15	0	0	0	22.06	5.49	0.63	56.89	83.2	0	0	0	185.75	328.49
25005	21	0	15	0	0	0	0	0	0	0	0	0	5	0	0	0	0
27002	51	7.7	8	74	0	0	0	0	0	0	49.9	89.5	0	0	0	200	300
28001	30	0	7.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table D-9: Fuel Usage

countyID	modelYearGroupID	sourceBinFuelTypeID	fuelSupplyFuelTypeID	usageFraction
2026				
21047	0	1	1	1.000000
21047	0	2	2	1.000000
21047	0	3	3	1.000000
21047	0	5	1	0.759473
21047	0	5	5	0.240527
21047	0	9	9	1.000000
2036				
21047	0	1	1	1.000000
21047	0	2	2	1.000000
21047	0	3	3	1.000000
21047	0	5	1	0.747799
21047	0	5	5	0.252201
21047	0	9	9	1.000000
2045				
21047	0	1	1	1.000000
21047	0	2	2	1.000000
21047	0	3	3	1.000000
21047	0	5	1	0.791668
21047	0	5	5	0.208332
21047	0	9	9	1.000000

Appendix E: MOVES Summary Outputs

Table E-1 2026 Summary Outputs

Month	Day	Hour	State	County	Run	NMHC	NOx	TotalHC	VOC	Distance
7	5	1	21	21047	5	16,404	80,697	18,894	17,957	154,263
7	5	2	21	21047	5	18,910	98,883	21,605	20,595	200,623
7	5	3	21	21047	5	16,711	87,882	19,170	18,252	177,579
7	5	4	21	21047	5	14,960	75,376	17,148	16,354	150,468
7	5	5	21	21047	5	15,127	72,246	17,157	16,470	146,401
7	5	6	21	21047	5	17,531	76,587	19,582	18,941	157,788
7	5	7	21	21047	5	27,132	83,105	29,557	28,876	164,837
7	5	8	21	21047	5	33,538	81,038	35,997	35,591	154,805
7	5	9	21	21047	5	35,084	85,806	37,559	37,259	162,125
7	5	10	21	21047	5	29,591	86,910	31,632	31,772	172,428
7	5	11	21	21047	5	35,420	103,521	37,635	38,161	210,655
7	5	12	21	21047	5	39,085	102,120	41,339	42,030	197,912
7	5	13	21	21047	5	36,596	75,085	38,450	39,556	135,827
7	5	14	21	21047	5	32,398	61,366	34,076	35,031	105,463
7	5	15	21	21047	5	27,932	51,928	29,488	30,127	83,503
7	5	16	21	21047	5	29,871	50,112	31,609	32,013	71,574
7	5	17	21	21047	5	28,645	42,563	30,373	30,844	52,596
7	5	18	21	21047	5	30,510	38,447	32,342	32,925	39,040
7	5	19	21	21047	5	29,196	34,534	31,091	31,732	29,280
7	5	20	21	21047	5	23,551	30,718	25,386	25,807	23,316
7	5	21	21	21047	5	20,070	31,189	22,054	21,976	21,960
7	5	22	21	21047	5	15,212	28,754	17,099	16,861	21,689
7	5	23	21	21047	5	13,866	30,702	15,820	15,343	26,569
7	5	24	21	21047	5	12,968	38,867	14,965	14,406	50,427
							1,548,436.00		648,879.00	Grams
							3,413.71		1,430.53	Pounds
							1.71		0.72	Tons

Table E-2 2036 Summary Outputs

Month	Day	Hour	State	County	Run	NMHC	NOx	TotalHC	VOC	Distance
7	5	1	21	21047	3	10,727	39,734	13,556	12,000	163,100
7	5	2	21	21047	3	12,140	46,374	15,143	13,496	212,116
7	5	3	21	21047	3	10,881	41,671	13,649	12,134	187,751
7	5	4	21	21047	3	9,838	36,211	12,312	10,981	159,087
7	5	5	21	21047	3	9,794	34,066	12,056	10,885	154,787
7	5	6	21	21047	3	10,942	35,101	13,173	12,062	166,826
7	5	7	21	21047	3	15,535	37,207	17,894	16,826	174,279
7	5	8	21	21047	3	19,319	36,108	21,598	20,842	163,673
7	5	9	21	21047	3	19,607	37,626	21,918	21,197	171,412
7	5	10	21	21047	3	17,626	37,042	19,545	19,264	182,305
7	5	11	21	21047	3	21,478	43,132	23,543	23,532	222,721
7	5	12	21	21047	3	23,404	42,536	25,431	25,601	209,249
7	5	13	21	21047	3	22,624	32,346	24,307	24,881	143,608
7	5	14	21	21047	3	19,823	26,996	21,339	21,820	111,504
7	5	15	21	21047	3	16,967	23,770	18,416	18,638	88,286
7	5	16	21	21047	3	17,195	23,346	18,731	18,780	75,674
7	5	17	21	21047	3	17,132	21,500	18,753	18,820	55,609
7	5	18	21	21047	3	18,494	20,669	20,229	20,376	41,277
7	5	19	21	21047	3	18,386	20,321	20,296	20,422	30,957
7	5	20	21	21047	3	15,575	19,742	17,578	17,443	24,651
7	5	21	21	21047	3	13,006	20,775	15,207	14,582	23,218
7	5	22	21	21047	3	10,559	20,249	12,782	11,972	22,931
7	5	23	21	21047	3	9,451	21,184	11,751	10,713	28,091
7	5	24	21	21047	3	9,115	24,216	11,494	10,355	53,316
							741,922.00		407,622.00	Grams
							1,635.66		898.65	Pounds
							0.82		0.45	Tons

Table E-3 2045 Summary Outputs

Month	Day	Hour	State	County	Run	NMHC	NOx	TotalHC	VOC	Distance
7	5	1	21	21047	5	9,337	33,731	12,392	10,571	173,974
7	5	2	21	21047	5	10,496	38,561	13,718	11,810	226,258
7	5	3	21	21047	5	9,470	34,831	12,448	10,686	200,269
7	5	4	21	21047	5	8,585	30,443	11,253	9,694	169,693
7	5	5	21	21047	5	8,506	28,414	10,937	9,561	165,107
7	5	6	21	21047	5	9,393	28,911	11,772	10,470	177,949
7	5	7	21	21047	5	12,834	30,333	15,280	14,047	185,898
7	5	8	21	21047	5	15,826	29,348	18,147	17,240	174,585
7	5	9	21	21047	5	16,000	30,319	18,355	17,475	182,841
7	5	10	21	21047	5	14,710	29,382	16,662	16,246	194,459
7	5	11	21	21047	5	18,083	33,766	20,171	20,013	237,571
7	5	12	21	21047	5	19,704	33,269	21,730	21,777	223,200
7	5	13	21	21047	5	19,218	25,707	20,908	21,344	153,183
7	5	14	21	21047	5	16,772	21,692	18,298	18,642	118,938
7	5	15	21	21047	5	14,159	19,442	15,629	15,707	94,172
7	5	16	21	21047	5	14,017	19,271	15,557	15,467	80,719
7	5	17	21	21047	5	14,052	18,353	15,710	15,596	59,316
7	5	18	21	21047	5	15,230	18,078	17,013	16,954	44,029
7	5	19	21	21047	5	15,396	18,355	17,400	17,274	33,021
7	5	20	21	21047	5	13,308	18,332	15,458	15,052	26,295
7	5	21	21	21047	5	11,092	19,516	13,468	12,575	24,766
7	5	22	21	21047	5	9,231	19,309	11,667	10,575	24,460
7	5	23	21	21047	5	8,242	20,103	10,761	9,449	29,964
7	5	24	21	21047	5	8,050	22,331	10,659	9,245	56,870
							621,797.00		347,470.00	Grams
							1,370.83		766.04	Pounds
							0.69		0.38	Tons

Appendix F: MOVES Model Input Development Report

Clarksville Urbanized Area MPO
Metropolitan Transportation Plan 2045

MOVES Model Input Development

Prepared For:

Prepared By:

NEEL-SCHAFFER
Solutions you can build upon

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LIST OF TABLES

MOVES Model Documentation

This report includes a description of the data and procedures used to develop the inputs for the MOVES2014a model to determine air quality conformity for the CUAMPO 2045 Metropolitan Transportation Plan. This report does not include how to operate the model.

1.0 Required Model Inputs

The MOVES2014a model requires the user to provide the following inputs for the RunSpec:

- Scale
- Time Spans
- Geographic Bounds
- Vehicles/Equipment
- Road Type
- Pollutants and Processes
- Strategies/Rate of Progress

The MOVES2014a model requires the user to provide the following inputs for the County Data Manager:

- Age Distribution
- Average Speed Distribution
- Fuel Data
- Meteorology Data
- Ramp Fraction
- Road Type Distribution
- Source Type Population
- Vehicle Type VMT
- I/M Programs

2.0 RunSpec Settings

For each MOVES model run, the parameters are contained within the RunSpec. These inputs determine the geographic and temporal scale of the model run, as well as the specific emissions to be calculated. The settings used in the conformity analysis were:

- Scale
    - Onroad (for Model)
    - County (for Domain/Scale)
    - Inventory (for Calculation Type)
- Time Spans
    - Hourly (for Time Aggregation Level)
    - Analysis years of 2026, 2036, and 2045
    - Weekdays (for analysis Days)
    - Month of July
    - All hours
- Geographic Bounds
    - Christian County, Kentucky
- Vehicles/Equipment
    - All on-road vehicle and fuel combinations selected
- Road Type
    - All road types selected
- Pollutants and Processes
    - NOx
    - VOC
    - Total Gaseous Hydrocarbons (VOC pre-requisite)

- Non-Methane Hydrocarbons (VOC pre-requisite)
- Refueling Displacement Vapor Loss and Refueling Spillage Loss are de-selected in the RunSpec as per the pre-analysis consensus plan.

- Strategies/Rate of Progress
  - Rate of Progress is not selected in the RunSpec as the MPO is not required to do so.

3.0 County Data Manager Inputs

3.1 Data Sources

The MOVES model provides many of the necessary inputs through its own internal database or available default data. However, some inputs need to be provided by the model user. Table 1 displays the initial data sources used for the Christian County, Kentucky MOVES input data.

Table 1: Data Sources for MOVES Input Files

Input	Description	Source(s)
roadTypeDistribution	Distribution of VMT within the modeled area based on MOVES roadway types	Kentucky Transportation Cabinet (KYTC), 2018
sourceTypeYear	Total number of vehicles in MOVES vehicle classes	KYTC, 2018
HPMSVTypeYear	Annual VMT of the modeled area by HPMS vehicle classes	KYTC, 2018
HPMSVTypeDay	Daily VMT of the modeled area by HPMS vehicle classes	N/A
monthVMTFraction	Monthly VMT adjustment factors when using annual VMT.	KYTC, 2018
dayVMTFraction	Daily VMT adjustment factors when using annual VMT	MOVES Defaults
hourVMTFraction	Hourly adjustment factors.	MOVES Defaults
avgSpeedFraction	Speed distribution by MOVES speed bins, hour, and roadway type.	KYTC, 2018
ageDistribution	Vehicle age breakdown by source type	KYTC, 2018
rampFraction	Percentage of interstate VHT on ramps	KYTC, 2018
ZoneMonthHour	Area meteorology data	MOVES Data Converter
FuelSupply	Fuels used in the modeled area	MOVES Defaults
FuelFormulation	Fuel formulation data within the modeled area	MOVES Defaults
FuelUsageFraction	Market share of fuels within the modeled area	MOVES Defaults
AVFT	Alternative Vehicle and Fuels Technologies	MOVES Defaults

3.2 Input Development Methodology

This section describes the methodology used to develop the necessary inputs for each model year.

roadTypeDistribution

Based on the Christian County, Kentucky Travel Demand Model (TDM), the KYTC provided the distribution of VMT within the county by MOVES' source type and road type. Local data was not available for each source type. Where necessary, the same road type distribution for all source types within the HPMS vehicle (Table 2) class was used (i.e., Intercity Bus, Transit Bus.) A road type fraction was not assigned to the non-road classification.

Table 2: MOVES Source Types and HPMS Vehicle Types

Source Type ID	Source Type Description	HPMS Vehicle Type ID	HPMS Vehicle Type Description
11	Motorcycle	10	Motorcycles
21	Passenger Car	25	Light Duty Vehicles- Short and Long Wheelbase
31	Passenger Truck		
32	Light Commercial Truck		
41	Intercity Bus	40	Buses
42	Transit Bus		
43	School Bus		
51	Refuse Truck	50	Single Unit Trucks
52	Single Unit Short-haul Truck		
53	Single Unit Long-haul Truck		
54	Motor Home		
61	Combination Short-haul Truck	60	Combination Trucks
62	Combination Long-haul Truck		

Source: EPA

However, the KYTC data reflects the MTP's base year (2016). As traffic patterns change due to growth, congestion, and construction, these distributions also change as roadway users select different roadway facilities to meet their needs. The distribution for each analysis year was created by:

1.) Using the Christian County, KY TDM to determine the VMT assigned to each MOVES roadway class for the base year and analysis years.

2.) Comparing the TDM VMT output for each MOVES roadway class to the HPMS VMT roadway class for the base year and each analysis year.

   a. This included proportioning out the VMT that encompasses the centroid connectors from the TDM into the TDM rural/urban local roads.

   b. Dividing the HPMS VMT by the TDM VMT to develop an adjustment factor for each MOVES roadway class.

$$MOVES\ Class\ VMT\ Adjustment\ Factors = \frac{HPMS\ VMT}{TDM\ VMT}$$

   c. Applying the adjustment factor to the TDM VMT to establish the base year and analysis year VMTs that would be used in calculating the road type distribution for the MOVES roadway classes.

$$Functional\ Class\ VMT = TDM\ VMT * MOVES\ Class\ VMT\ Adjustment\ Factor$$

sourceTypeYear

The KYTC data provides the base year number of vehicles in each of the 13 source types used in MOVES. As the region grows, the number of personal automobiles, commercial vehicles, and freight trucks in the modeled area will increase. The source types for the analysis years were created by:

1.) Using the TDM to obtain the total number of auto, commercial, or freight truck trips for the TDM base year and analysis years.

2.) Using the TDM vehicle occupancy factors to convert the number of trips for each type to the total auto and truck vehicles in the county for each year.

$$Vehicles = TDM\ Trips * Occupancy\ Factors$$

3.) Summing the change in household autos and commercial vehicles from the base year to an analysis year to represent growth in total automobiles.

4.) Calculating the change in freight truck trips between the base year and an analysis year to represent the growth in total trucks.

5.) Using the calculated change in each category to determine the percent growth from the base year to an analysis year for the total auto and total trucks.

6.) Using the percent growth in total autos and total trucks to forecast the analysis year's total autos and total trucks by multiplying the percent growth by the original input data.

7.) Multiplying the analysis year's total auto and total truck populations by the proportions of each original data source type (within the total auto or total truck population that they belong to) to produce the updated analysis year source type populations.

HPMSVTypeYear

The vehicle class VMTs were developed using the US EPA Excel Spreadsheet calculator Tool for MOVES. It used state activity data, such as:

- Ramps
- Functional Class VMT

- Comparing MOVES defaults on Source Type Population and VMT to actual Source Type Population and VMT
- Adjustment factors for day of the week and month.

The Christian County MOVES model runs conducted for the conformity analysis uses annual VMT.

Table 3: VMT Adjustment Factors

Functional Classification	Christian County Adjustment Factor
1	1.0890
2	0.7570
6	1.1440
7	0.9020
8	0.9190
9	0.5240
11	0.0000
14	0.7590
16	1.1390
17	1.5750
19	0.9490
Rural Centroid Connector	1.0000
Urban Centroid Connector	1.0000

Source: NSI, HPMS

Table 4: Seasonal Adjustment Factors

Functional Classification	Christian County Adjustment Factor
1	1.0270
2	1.0140
6	1.0140
7	1.0140
8	1.0140
9	1.0140
11	0.0000
14	1.0100
16	1.0100
17	1.0100
19	1.0100
Rural Centroid Connector	1.0140
Urban Centroid Connector	1.0100

Source: KYTC

HPMSVTypeDay

Since the Christian County model runs use annual VMT, this model input is not required.

monthVMTFraction

The month VMT fractions were developed at the same as the annual VMT using the US EPA Excel Spreadsheet calculator Tool for MOVES. It used state activity data, such as:

- Ramps
- Functional Class VMT
- Comparing MOVES defaults on Source Type Population and VMT to actual Source Type Population and VMT

dayVMTFraction

KYTC does not have the data readily available; therefore, the default values from the US EPA Excel Spreadsheet calculator Tool for MOVES were used for this input.

hourVMTFraction

KYTC does not have the data readily available; therefore, the default values from the US EPA Excel Spreadsheet calculator Tool for MOVES were used for this input.

averageSpeedFraction

The TDM was used to determine average speed distribution for the base year and analysis years. The speed data covers source types 11, 21, 31, 32, 43, 51, 52, 53, 54, 61, and 62. Data for source types 41 and 42 use the same distribution as source type 43 since they are all in the buses category.

The speed distributions were obtained by:

1.) Using the TDM to obtain the average daily speeds (by link) for each model year.

2.) Assigning each link to a MOVES speed bin and MOVES roadway type.

3.) Summing the total VHT for each speed bin and roadway type.

4.) For each roadway type, calculating the change in VHT for each speed bin from the base year to an analysis year.

5.) Using the calculated change to develop the relative percent of the total change for each speed bin.

6.) Creating an adjustment factor based on the relative percent of change to be applied to the base year distribution to create an adjusted distribution for the analysis year.

7.) Normalizing the analysis year distribution so that the percentages for all speed bins add up to 1.0.

ageDistribution

This input data was developed by KYTC. As stated in the EPA guidance, this data is not adjusted between analysis years. KYTC developed age distributions for the following vehicle types based on the state's motor vehicle registration data:

- Motorcycle
- Passenger Car
- Passenger Truck
- Light Commercial Truck

- School Bus
- Refuse Truck
- Single Unit Short-haul Truck
- Single Unit Long-haul Truck
- Motor Home
- Combination Short-haul Trucks
- Combination Long-haul Trucks

Since no vehicle registration or local data sources were available for the following age distributions, MOVES default age distributions were used for:

- Intercity Bus
- Transit Bus

rampFraction

The TDM provides outputs on the daily VHT on each roadway link. The percent of the ramp VHT to the total interstate VHT is the rampFraction input. This input was calculated for each individual analysis year.

$$Ramp\ fraction = \frac{VHT\ on\ Interstate\ Ramps}{\text{Total VHT on Interstate}}$$

ZoneMonthHour

This input was provided by converting the MOBILE6.2 meteorological data from the previous conformity analysis into MOVES2014a format. The minimum and maximum daily temperatures previously used with MOBILE6.2 for Christian County were 67 and 94 degrees Fahrenheit, respectively, which were converted to a 24-hour distribution with the MOVES conversion tool. The humidity value in the MOVES model also remained consistent; using the previously used 75 gr/lb absolute humidity. No forecasting was needed on this input.

FuelSupply

This model input used the default MOVES data.

FuelFormulation

This model input used the default MOVES data.

FuelUsageFraction

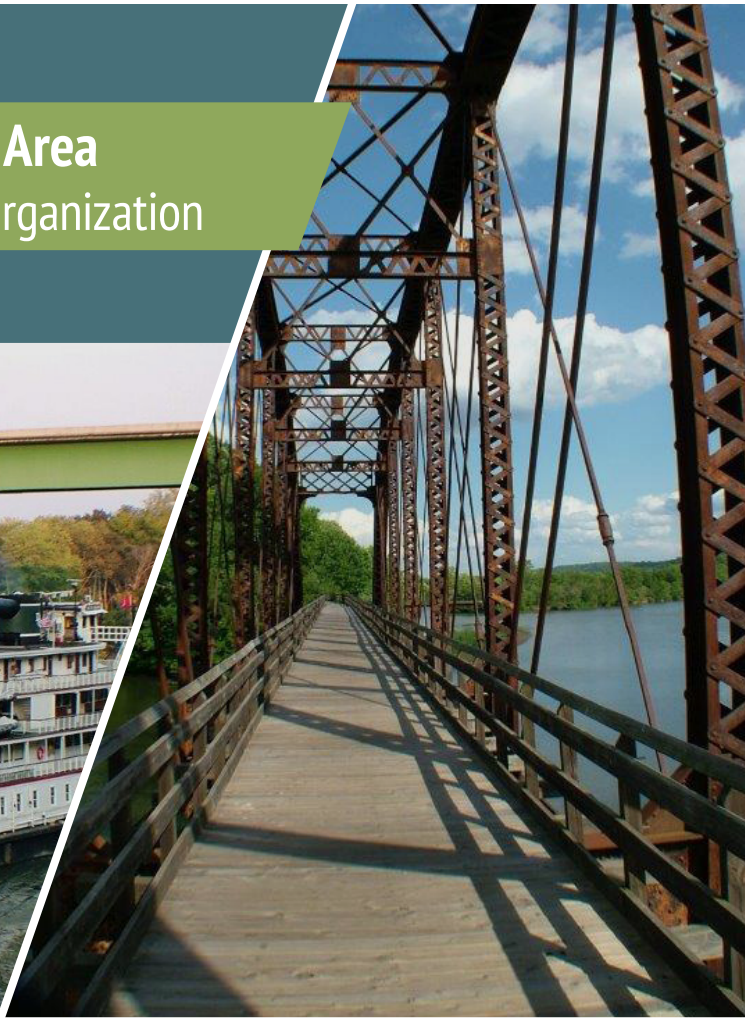
This model input used the default MOVES data.

AVFT

This model input used the default MOVES data.

Clarksville Urbanized Area

Metropolitan Planning Organization



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